

Annual Report

October 2018

This document contains the Task Force's 2018 Annual Report with recommendations for policy makers and stakeholders to consider in the 2019 legislative session.

Governor's Task
Force on Broadband

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Dear Governor Dayton,

As the world becomes increasingly interdependent and connected, access to broadband is increasingly important. From healthcare to commerce and education, broadband provides a critical link for Minnesota's rural and urban residents alike. Over the last four years, this Task Force on Broadband has explored these issues and more—and have made recommendations to you and the legislature for expanding access to broadband statewide.

Now, as this Task Force submits to you our final report, we are pleased to report that real progress has been made in deploying broadband throughout Minnesota. The share of Minnesota households with access to wireline broadband at the state speed goal of 25 megabits per second (Mbps) download and 3 Mbps upload (25 Mbps/3 Mbps) has increased from **69.64 percent in 2011 to 90.77 percent in March 2018**. Nearly 75 percent (73.66 percent) of Minnesota households now have access to wireline at the 2026 speed goal of 100 Mbps/20 Mbps.

Minnesota's Border-to-Border Broadband Development Grant Program contributed significantly to this progress. During the first four years of the grant program, it awarded \$85.2 million in funding, in turn leveraging \$110.6 million in matching local and/or private investments, making service available to more than 34,000 households, 5,200 businesses and 300 community institutions across Minnesota.

Although this report is our final report to you, the content and many of the recommendations contained in past reports are just as relevant and important now as they were when the reports were written. This report highlights the work of the Task and makes policy recommendations not only for you to consider but for the consideration of Minnesota's next governor and legislature. These recommendations include: funding for the state's Border-to-Border Broadband Development Grant Program; funding for the Office for the Office of Broadband Development, and maintaining its existing relationship with the Department of Commerce; and the continuation of a Minnesota Task Force on Broadband.

As you depart the Office of Governor, we thank you for your commitment to broadband policy over your last eight years of service. We are confident that without your attention to this issue, fewer Minnesotans would have access to broadband than currently do. We are also confident that expanding access to broadband is not a partisan issue; that all Minnesotans, regardless of political affiliation, should have access to broadband.

We are hopeful that the issue of broadband expansion and adoption will remain a priority for the incoming governor and new legislature.

Sincerely,



Margaret Anderson Kelliher

Chair, Governor's Task Force on Broadband

Members of the Governor's Task Force on Broadband

Margaret Anderson Kelliher (Chair), Minnesota High Tech Association

Hannah Buckland, Hennepin County Library (formerly with Leech Lake Tribal College)

Denise Dittrich, Minnesota School Boards Association

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Michael Nguyen, Communications Workers of America

Neela Mollgaard, Red Wing Ignite

Donald Niles, City of Wadena

Jody Reisch, Rock County

Daniel Richter, MVTW Wireless

Andrew Schriener, CenturyLink

Richard Sjoberg, Sjoberg's Cable

Paul Weirtz, AT&T

Executive Summary

This report highlights the work of the Task Force on Broadband in 2018 and makes policy recommendations to the Governor and Legislature. This report is also the last report to Governor Dayton, and so we take this opportunity to reflect on our past contributions to broadband policy and look forward to issues that the next governor and future legislatures might consider when developing policies to increase the access and use of broadband.

Over the last seven years, the Task Force on Broadband has studied issues related to broadband affordability, adoption, and accessibility, and has made recommendations to remove barriers to broadband deployment, modernize Minnesota's telecommunications regulatory framework and create the Office of Broadband Development. The Task Force has also consistently recommended funding Minnesota's Border-to-Border Broadband Development Grant Program. This program has leveraged state and private investment to provide broadband service to thousands of households and businesses across Minnesota, connecting unserved and underserved areas of the state.

The Task Force has recommended and worked with policymakers on updating Minnesota's statutory broadband speed goals. These goals are important because they provide policymakers with an objective to work toward and help direct investment in broadband infrastructure. These goals are also important because they provide the context from which to measure progress—progress toward connecting Minnesota's residents with broadband so they can access telemedicine, online education, connect with loved ones across the world; progress toward connecting Minnesota's businesses with broadband so they can access new markets and customers, from across the street to the other side of the planet; progress toward connecting Minnesota's community institutions so they can provide vital services and access to services to our children, elderly and those in need.

We are pleased to say that we are, indeed, making progress. The share of Minnesota households with access to wireline broadband at the state speed goal of 25 megabits per second (Mbps) download and 3 Mbps upload (25 Mbps/3 Mbps) has increased from **69.64 percent in 2011 to 90.77 percent in March 2018**. Nearly 75 percent (73.66 percent) of Minnesota households now have access to wireline at the 2026 speed goal of 100 Mbps/20 Mbps.

Minnesota's Border-to-Border Broadband Development Grant Program contributed significantly to this progress. During the first four years of the grant program, it awarded \$85.2 million in funding, in turn leveraging \$110.6 million in matching local and/or private investments, making service available to more than 34,000 households, 5,200 businesses and 300 community institutions across Minnesota. These are households, businesses and community institutions that might not otherwise have access to broadband, if not for this grant program and continued investment by Minnesota telecommunications providers.

Access to broadband at state speed goals, however, is not uniformly distributed across the state. In rural areas of Minnesota, 79.26 percent of rural households have access to speeds of 25 Mbps/3 Mbps; 58.99 percent of households have access to speeds of 100 Mbps/20 Mbps. These households, businesses and communities are missing out on the economic benefits of broadband. A 2017 report by the Internet Innovation Alliance (IIA), for example, notes that access to the Internet is associated with an American household saving, on average, \$12,063.19 per year.¹

¹ <https://internetinnovation.org/special-reports/savings/>, accessed August 9, 2018.

These statistics show that while Minnesota is making remarkable progress toward connecting the state, border to border, more work remains. The state speed goals are both aspirational and attainable, but they are not immutable. As technologies evolve and policies change, the state's broadband speed goals may also change. This report looks ahead to potential changes in technology and state and federal policy that will impact policy decisions future state lawmakers are likely to face. The report also reflects on the past contributions of this Task Force and makes the following policy recommendations:

1. Fund the Office of Broadband Development through the base budget at levels sufficient for it to meet its statutory mandates and create an OBD operating fund to advance and promote programs and projects to improve broadband adoption and use, and the maintain existing partnership with the Minnesota Department of Commerce.
2. Provide on-going biennial funding of the Border-to-Border Broadband Development Grant Program at \$69.7 million per biennia until the state achieves its broadband speed goals.
3. Provide direct funding to the Department of Employment and Economic Development for broadband mapping.
4. Establish a legislative cybersecurity commission to enable information-sharing between policy-makers, state agencies, and private industry related to Minnesota's cybersecurity infrastructure, cybersecurity workforce issues and emerging technology, whose scope of work includes: (a) developing legislation to support and strengthen Minnesota's cybersecurity infrastructure, and (b) providing input or recommendations related to developing a multi-year strategic plan to secure Minnesota's IT environments.
5. Continue to understand the advances in technology that will drive both the demand for better broadband access and that will enable the delivery of broadband access to its citizens.
6. Take action to promote and communicate dig once policies, including development and dissemination of best practices and model policies to state agencies and other stakeholders. Ensure that agencies with construction oversight, construction funding, and land stewardship responsibilities ensure that they lead by example in implementing "Dig Once" policies which encourage broadband competition and deployment, including planning, joint use, construction and notification.
7. Fully fund the Telecommunications Equity Aid (TEA) and Regional Library Telecommunications Aid (RLTA) to facilitate broadband in K-12 education and libraries.
8. Continue a Minnesota Broadband Task Force as a resource to the Governor and the Legislature on broadband policy with a broad representation of perspectives and experiences, including provider, community, business and labor interests.

Introduction

This report is our final report to Governor Dayton; it is the final opportunity for the Task Force on Broadband to share its findings and recommendations for how to expand the access and use of broadband throughout Minnesota. We take this opportunity to not only share our perspective on these challenges but to reflect on our past contributions as a Task Force and on the progress the state has made on achieving its broadband speed goals. We will also take this opportunity to look forward to technology changes and policy issues that the next governor and future legislators are likely to face when developing policies to expand broadband access and use throughout Minnesota.

Broadband provides opportunities to those who use it. Indeed, previous reports from this Task Force have reported on the economic impact of broadband for families, businesses and communities. This report highlights some of those economic benefits and provides an overview of emerging technologies that stand to affect the use and availability of broadband, from telemedicine and precision agriculture to online learning and access to new markets. As consumers and businesses continue to adopt these data-intensive technologies, access to broadband is increasingly important.

Minnesota has made great strides in expanding access to broadband throughout the state. The share of Minnesota households with access to wireline broadband speeds of 25 megabits per second (Mbps) download and 3 Mbps upload (25 Mbps/3 Mbps) has increased from 69.64 percent in 2011 to 90.77 percent in March 2018.² The share of Minnesota households with access to fixed, non-mobile service at speeds of 25 Mbps/3 Mbps has increased from 69.64 percent in April 2011 to 95.59 percent in March 2018.³

Historical Estimate of 25 Mbps Download and 3 Mbps Upload Broadband Service Availability in the State of Minnesota		
Date	Wireline (%)	Fixed, Non-Mobile (%)
April 2011	69.64	69.64
April 2012	70.56	70.56
April 2013	82.03	82.96
April 2014	84.10	85.27
February 2015	85.83	88.29
July 2016	87.72	89.98
April 2017	87.94	93.06
March 2018	90.77	95.59

Source: *Connected Nation*, Mar. 2018.

² Wireline technologies include digital subscriber lines (DSL) and fiber-based broadband services.

³ Fixed broadband includes wired (copper, coaxial and fiber) as well as non-mobile wireless connections.

Developments in technology and changes in policy, particularly at the federal level, interact in unique ways to shape Minnesota's approach to broadband policy. As the state looks forward to a new governor and new members of the legislature in 2019, this report provides some background on broadband policy over the last seven to eight years and looks ahead to developments in technology and considerations that state policymakers should take into account when formulating broadband policy.

History of Minnesota's Statewide Expansion of Broadband Access

In 2010, prior to the establishment of this Task Force, broadband goals were included in statute as a recommendation from the legislatively created *Ultra High Speed Broadband Task Force*⁴ that existed from mid-2008 until the end of 2009. Those goals included a speed goal: that all households and businesses should have access to broadband service of at 10-20 Mbps download and 5-10 Mbps upload by 2015; as well as the following comparative goals:

Subd. 2. State broadband leadership position.

It is a goal of the state that by 2022 and thereafter, the state be in:

- (1) the top five states of the United States for broadband speed universally accessible to residents and businesses;
- (2) the top five states for broadband access; and
- (3) the top 15 when compared to countries globally for broadband penetration.

The Minnesota Legislature revisited the broadband speed goal in 2016, and at the recommendation of this Task Force, established the following new goals:

Subdivision 1. Universal access and high-speed goal.

It is a state goal that:

- (1) no later than 2022, all Minnesota businesses and homes have access to high-speed broadband that provides minimum download speeds of at least 25 megabits per second and minimum upload speeds of at least three megabits per second; and
- (2) no later than 2026, all Minnesota businesses and homes have access to at least one provider of broadband with download speeds of at least 100 megabits per second and upload speeds of at least 20 megabits per second.

Creation of the Office of Broadband Development

The Office of Broadband Development (OBD), located within the Department of Employment and Economic Development (DEED), was established during the 2013 Legislative Session.⁵ Creation of the OBD was a recommendation of this Task Force in its 2012 Annual Report.⁶ OBD plays an important role in developing Minnesota's broadband infrastructure, including working with partners on mapping broadband availability to more effectively direct state investment. OBD also assists the Governor's Task Force on Broadband, the Governor's Broadband Subcabinet, and oversees the state's Border-to-Border Broadband Development Grant Program.⁷

⁴ <https://www.leg.state.mn.us/lrl/agencies/detail?AgencyID=1894>

⁵ Minnesota Session Laws, 2013 regular session, chapter 85 at Article 3, sections 13, 14, and 26.

⁶ [2012 Annual Report and Broadband Plan](#) at p. 33.

⁷ More information about the Office of Broadband Development can be found in its annual report: https://mn.gov/deed/assets/broadband-dev-report_tcm1045-132774.pdf. Danna Mackenzie, Executive Director,

In administering the Border-to-Border grant program, the Office of Broadband Development considers a number of criteria, as defined in statute, in evaluating and awarding the grants to eligible entities, including cost, community support, the number of households and community institutions impacted by the project, and demonstrated need for economic development, among others.⁸

In addition to administering the state's Border-to-Border Broadband Development Grant Program, the Office of Broadband Development is tasked with a number of other responsibilities. These responsibilities are assigned in state statute, and include serving as the central broadband planning body for the state of Minnesota; monitoring broadband development efforts of other states and nations in areas such as business, education, public safety, and health; driving job creation, promoting innovation, and expanding markets for Minnesota businesses. More information on the accomplishments of the OBD can be found in its most recent report at [Office of Broadband Development Annual Report](#).

Currently, \$500,000 per biennium from the state's General Fund supports OBD's operations and administration, which include: two full-time employees; office space, utilities, computers, advertising, printing, supplies; expenses for holding meetings of the Governor's Task Force on Broadband; outreach; and staff research and development. The Minnesota Department of Commerce provides one full-time employee, as an analyst and general support to the program. Finally, as specified in statute, up to three percent of the grant appropriation is available for grant administration, mapping, data acquisition, and analysis.

Maintaining the volume and quality of work provided by OBD requires sufficient funding from the Legislature. While OBD has received sufficient funding, from one legislative session to the next, the uncertainty of biennial funding hinders long-term planning and could impair continued successful implementation of the Border-to-Border Broadband Development Grant Program. The success of the Border-to-Border Broadband Development Grant Program is in large part tied to the success of OBD. That's why providing OBD with full funding, on an on-going basis is so important—and that is why we are including it as a recommendation.

The Minnesota Broadband Model

Minnesota has established itself as a national leader and model for broadband infrastructure development. Minnesota's legislatively created broadband goals, development office, mapping and grant program are frequently referenced as "the Minnesota Model" by other state and federal policy makers looking to assure the needs of their citizens in the ever-burgeoning connected world. Minnesota's leadership is characterized by a statutory framework key components of which include (1) realistic, forward-looking internet speed goals; (2) an Office of Broadband Development within the Department of Economic Development charged with numerous broadband oversight responsibilities, including supporting the Governor's Task Force on Broadband; (3) broadband deployment mapping capabilities to accurately plan, monitor and track broadband infrastructure; and (4) the Border-to Border Broadband Development Grant Program to provide matching funds for broadband infrastructure deployment in unserved and underserved areas.

Office of Broadband Development, received the 2017 Community Broadband Hero of the Year from the National Association of Telecommunications Officers and Advisors (NATOA).

⁸ Minnesota Session Laws, 2014 regular session, chapter 312 at article 3, sections 3.

Recommendations

Fund the Office of Broadband Development through the base budget at levels sufficient for it to meet its statutory mandates and create an OBD operating fund to advance and promote programs and projects to improve broadband adoption and use, and maintain the existing partnership with the Minnesota Department of Commerce.

Border-to-Border Broadband Development Grant Program

Created by the Minnesota Legislature in 2014, the Minnesota Border-to-Border Broadband Development Program funds the expansion of broadband service to areas of Minnesota that are unserved or underserved. An **underserved area** is an area “of Minnesota in which households or businesses lack access to wire-line broadband service at speeds of at least 100 megabits per second download and at least 20 megabits per second upload.” Minn. Stat. § 116J.394(h). An **unserved area** is an area of Minnesota in which households or businesses lack access to wire-line broadband service with transmission speeds of at least 25 Mbps download and 3 Mbps upload. Minn. Stat. § 116J.394(i) (2017); see Minn. Stat. § 116J.39. subd. 1(b) (2017).

The Border-to-Border Broadband Development Grant Program can pay up to 50 percent of the broadband development costs for a qualifying project, including the acquisition and installation of middle-mile and last-mile infrastructure that support broadband service scalable to speeds of at least 100 Mbps download and 100 Mbps upload. Each grant is capped at \$5 million per project.

Last mile infrastructure is broadband infrastructure that serves as the final leg connecting the broadband service provider’s network to the end-use customer’s on-premise telecommunications equipment. Middle mile infrastructure is broadband infrastructure that links a broadband service provider’s core network infrastructure to last-mile infrastructure.

Construction of broadband infrastructure may include any of the following: project planning; obtaining construction permits; construction of facilities, including construction of both "middle mile" and "last mile" infrastructure; equipment; and installation and testing of the broadband service.

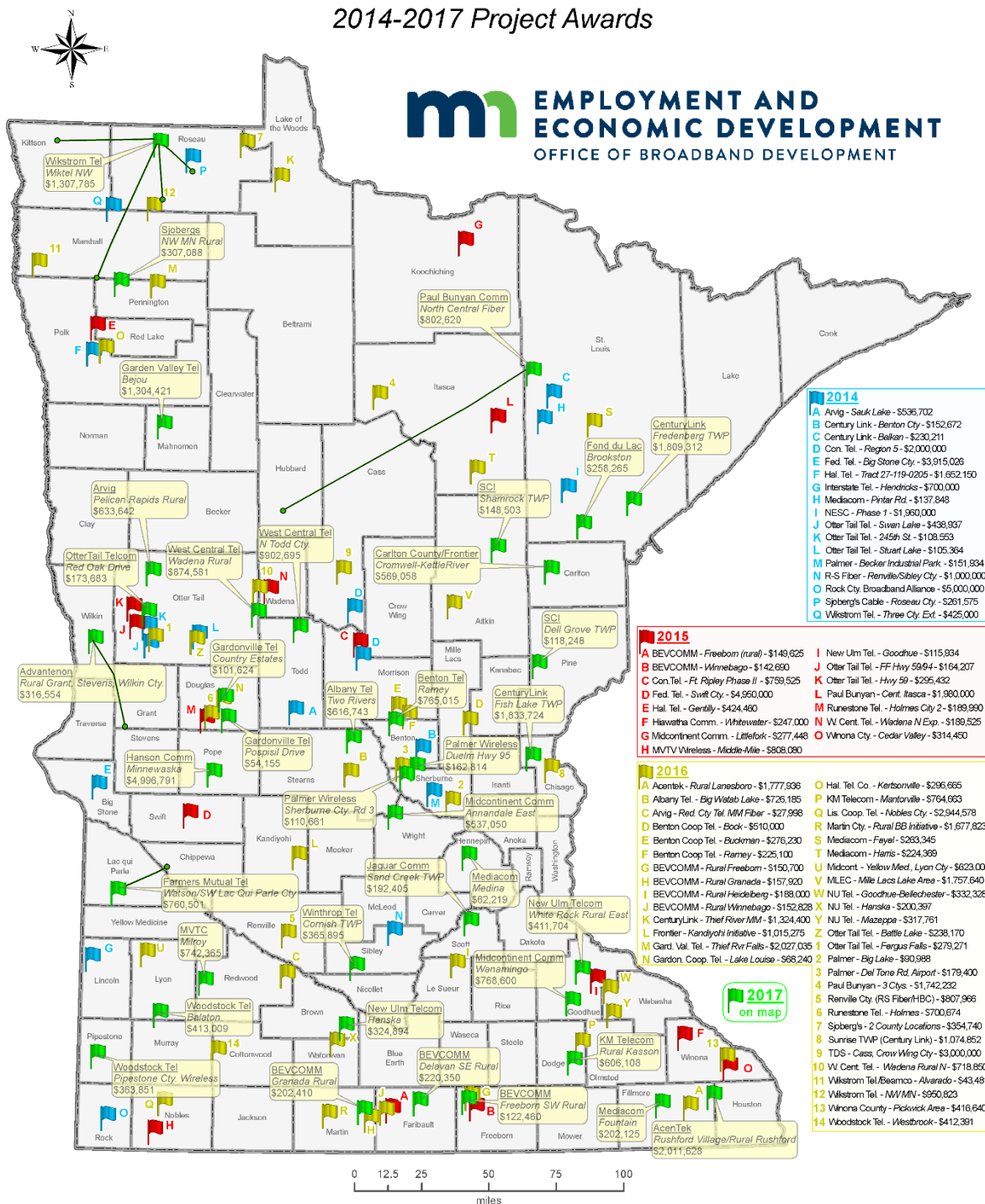
The grant program is designed to foster collaboration between public and private organizations and the leveraging of public funds. Eligible organizations include:

1. Incorporated businesses or partnerships;
2. Political subdivisions;
3. Indian tribes;
4. Minnesota nonprofit organizations organized under chapter 317A;
5. Minnesota cooperative associations organized under chapter 308A or 308B; and
6. Minnesota limited liability corporations organized under chapter 322B for the purpose of expanding broadband access.

While the program is set up to provide dollar-for-dollar matching funds to grant recipients, it is not uncommon for grant recipients to commit more than 50 percent of the total project cost thereby further leveraging state dollars.

Minnesota Border-to-Border Broadband Development Grant Program

2014-2017 Project Awards



During the first four years of the Border-to-Border Broadband Development Grant Program, the grant program has awarded \$85.2 million in funding, in turn leveraging \$110.6 million in matching local and/or private investments, making service available to more than 34,000 households, 5,200 businesses and 300 community institutions across Minnesota. Grant applications have consistently exceeded available grant funds. For example, in 2017 the Office of Broadband Development reviewed 70 grant applications, with requests totaling more than \$50 million, all competing for \$20 million in funding allocated to the grant program in 2017. Funding of the Border-to Border Development Grant Program continued to receive bipartisan support in the 2018 legislative session via inclusion in the later vetoed omnibus jobs bill.

We're Not There Yet – Meeting the Goals

The Task Force has consistently recommended continued funding of the Border-to-Border Broadband Development Grant Program in order to assure that Minnesota meets the broadband goals established by the legislature. The continued exponential growth of demand for broadband bandwidth is a reality, one which our legislature has recognized by law as necessary for Minnesota citizens and businesses to be connected and remain competitive in a 21st century global economy.

The most recent data available to the Task Force indicates good progress towards meeting Minnesota's broadband goals, but that there remain significant areas in the state where broadband availability is lacking, either unserved or underserved using statutory definitions. Statewide, 90.77 percent of households have access to broadband at speeds of 25 Mbps/3 Mbps, while 73.66 percent of households have access to broadband at speeds of 100 Mbps/20 Mbps, as reported by Connected Nation in April 2018. Application of the Minnesota Statutes section 116J.394 definitions of "unserved" and "underserved" reveals that 9.23 percent of Minnesota households are unserved (down from 11.89 percent in October 2017), while 26.34 percent of Minnesota households are underserved (down from 29.93 percent in October 2017).

The numbers of "unserved" and "underserved" in rural Minnesota are greater. A smaller share of households in rural Minnesota—79.26 percent, compared to 90.77 percent statewide—have access to broadband at speeds of 25 Mbps/3Mbps, while 58.99 percent of rural Minnesota households have access to broadband at speeds of 100 Mbps/20 Mbps, as reported by Connected Nation in October 2017. Within Minnesota, 20.74 percent of rural households are unserved (down from 26.55 percent in October 2017), and 41.01 percent of rural households are underserved (down from 47.12 percent in October 2017).

Historical Estimate of Wireline Broadband Service Availability Statewide and in Rural Areas of Minnesota

Date	25 Mbps/3 Mbps (2020 Goal)		100 Mbps/20 Mbps (2026 Goal)	
	Statewide	Rural	Statewide	Rural
February 2015	85.83%	68.08%	39.14%	40.68%
July 2016	87.72%	72.24%	68.45%	48.93%
October 2016	87.53%	72.03%	68.53%	49.33%
April 2017	87.94%	73.07%	69.86%	52.46%
October 2017	88.11%	73.45%	70.07%	52.88%
April 2018	90.77%	79.26%	73.66%	58.99%

As can be seen in the table, there remains work to be done in order to meet the Minnesota broadband goal that by “no later than 2022, all Minnesota businesses and homes have access to high-speed broadband that provides minimum download speeds of at least 25 megabits per second and minimum upload speeds of at least three megabits per second” and the 2026 goal of “download speeds of at least 100 megabits per second and upload speeds of at least 20 megabits per second.” Minn. Stat. § 237.012, subd. 1 (2017).

In its 2017 annual report, the Task Force recommended on-going biennial funding of the Border-to-Border Broadband Development Grant Program at \$71.48 million per biennia until the state achieves its broadband speed goals. Based on new information, including an update of the number of unserved households and incoming Alternative Connect America Cost Model (A-CAM) funding, **the Task Force recommends on-going biennial funding of the Border-to-Border Broadband Development Grant Program at \$69.7 million per biennia until the state achieves its broadband speed goals.** This number accounts for the grant program not being funded in 2017, and is based on current numbers of Minnesota unserved households and factors in anticipated federal funding under the Federal Communication Commission’s Connect America Fund (CAF II).⁹ Reliable funding of the program will provide a level of certainty that assist and accelerate planning for the technology, collaboration and long-term investments needed to reach Minnesota’s broadband goals.

Recommendations

Provide on-going biennial funding of the Border-to-Border Broadband Development Grant Program at \$69.7 million per biennia until the state achieves its broadband speed goals.

⁹ The FCC’s CAF II program requires broadband providers to meet a minimum speed standard of 10 Mbps/1 Mbps.

Calculation of Recommended Funding Level for the Grant Program (updated from 2017)

193,000 (unserved households)	
x \$5,527 (average cost of connection)	

\$1,066,711,000 (total cost of connecting unserved households)	
x 50% (state's share of total cost)	

\$533,355,500 (state's total cost to connect unserved households)	
÷ 3 (number of years remaining to achieve state broadband speed goals)	

\$177,785,167 (state's annual cost to connect unserved households)	
– \$85,000,000 (annual CAF II funding)	
– \$58,950,000 (annual A-CAM funding)	

\$33,835,167 (state's remaining annual cost of connecting unserved households)	
x 1.03 (accounting for standard 3 percent administrative costs)	

\$34,850,222 (annual contribution from grant program to connect unserved households)	
x 2 (years in a biennium)	

\$69,700,444 (2018 biennial recommendation)	

The maps on the following four pages illustrate¹⁰:

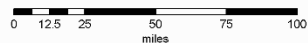
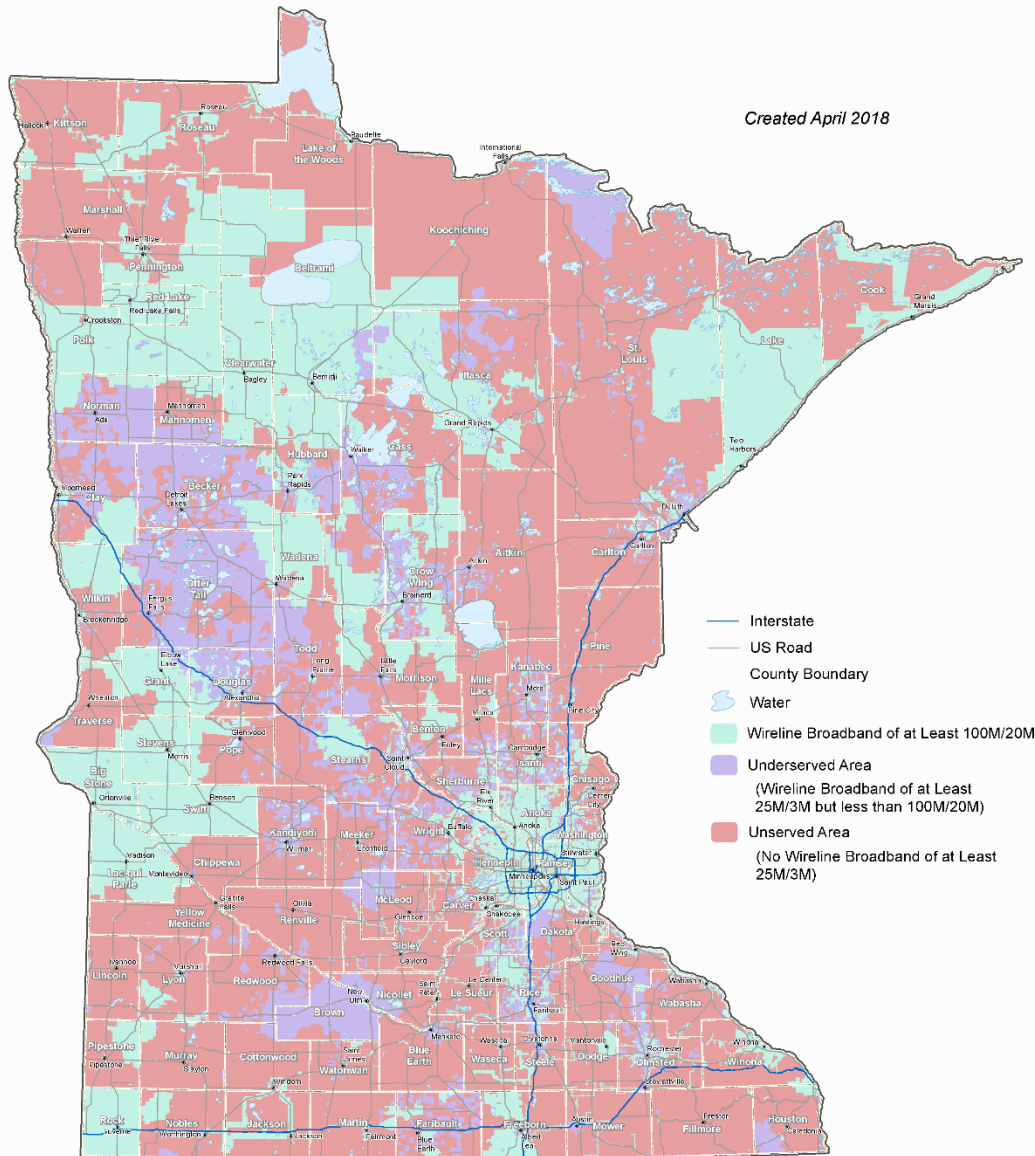
1. The areas of the state that are unserved, underserved and served;
2. The percentage of households served by wireline broadband service by school district at speeds of 25 Mbps/3 Mbps;
3. The percentage of households served by wireline broadband service by county at speeds of 25 Mbps/3 Mbps; and
4. The percentage of households served by wireline broadband service by county at speeds of 100 Mbps/20 Mbps.

¹⁰ Additional maps can be found at: <https://mn.gov/deed/programs-services/broadband/maps/general-maps.jsp>.

2018 Broadband Service Inventory for the State of Minnesota

Border-to-Border Broadband Development Grant Program

Unserved, Underserved and Served Broadband Areas



Submit questions or recommended changes to:
DEED.broadband@state.mn.us

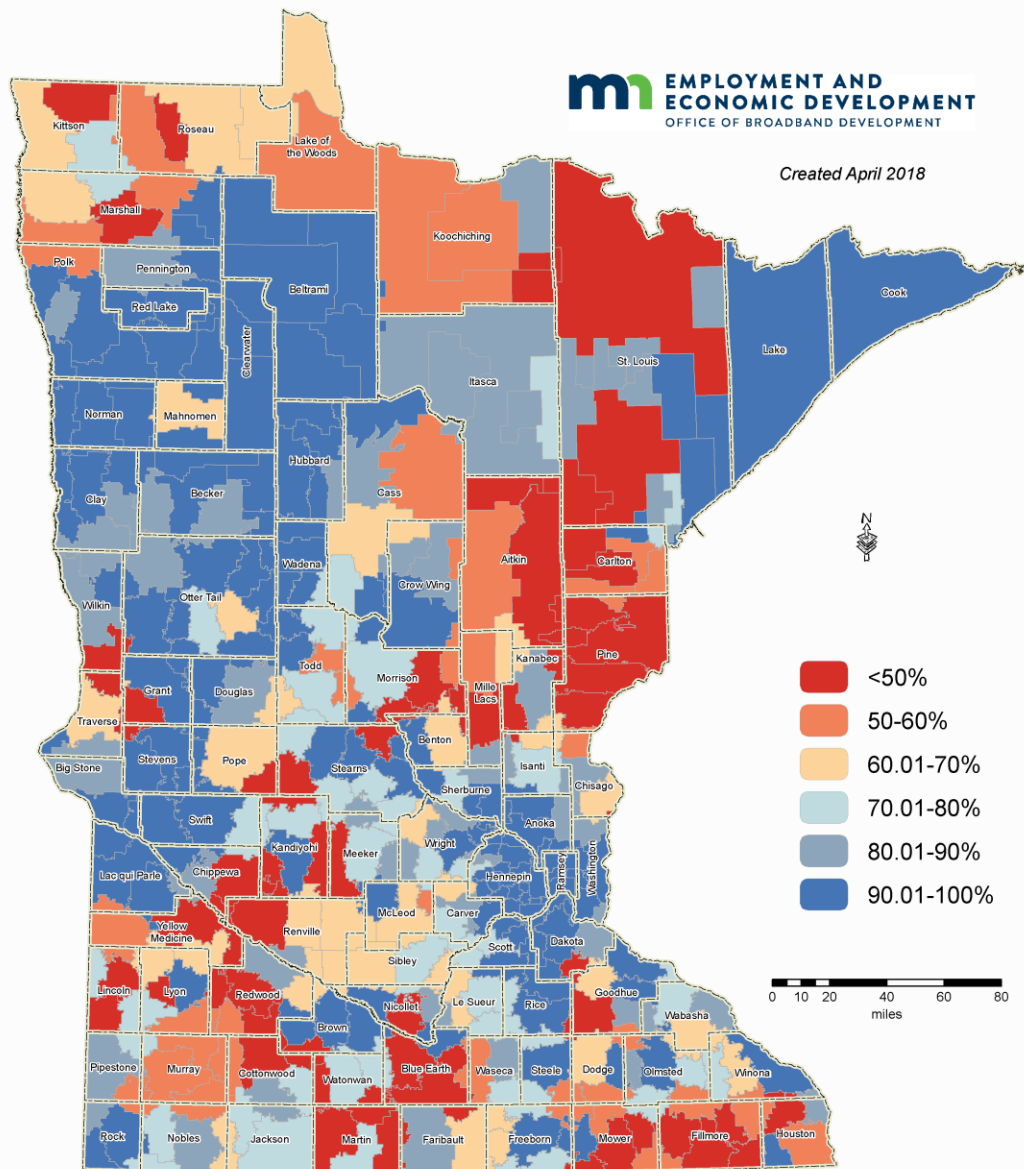
This map was prepared by Connected Nation under contract with the Minnesota Department of Employment and Economic Development. The map represents areas of broadband service availability based on provider data submitted to and analyzed by Connected Nation and modified based on validation tools. The data is current as of December 31, 2017.

Additional maps and data are available at
<http://mn.gov/deed/programs-services/broadband/maps>
Upon request, this information can be made available in alternate formats for people with disabilities by contacting the DEED Office of Broadband Development at 651-259-7610.

School District Map

Percentage of Households Served by Wireline Broadband Service by School District

At Least 25 Mbps Download/3 Mbps Upload Speeds
Statewide Availability: 90.77%, Rural: 79.26%



This map was prepared by Connected Nation under contract with the Minnesota Department of Employment and Economic Development. The map represents areas of broadband service availability based on provider data submitted to and analyzed by Connected Nation and modified based on validation tools. The data is current as of December 31, 2017.

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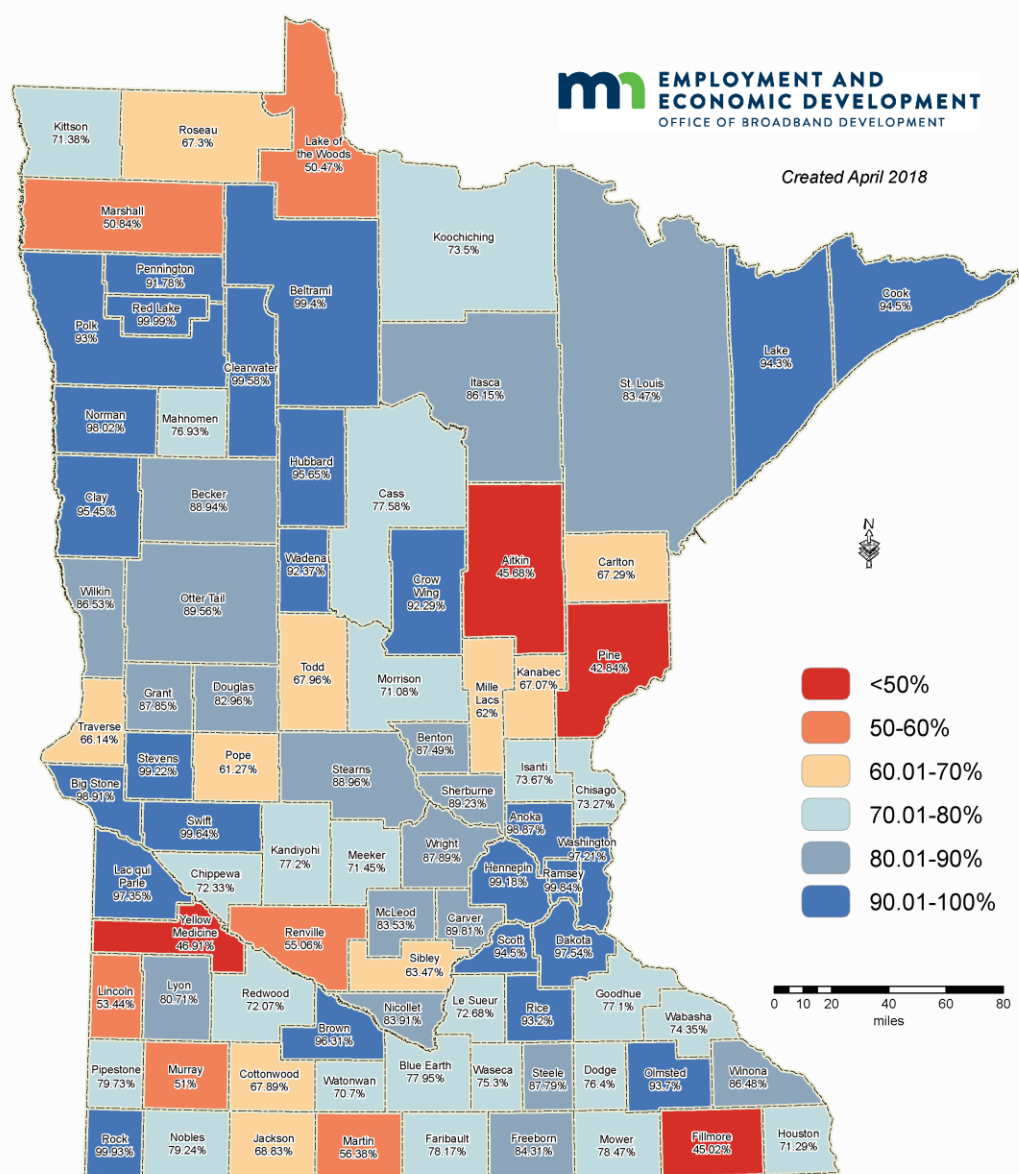
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County Map

Percentage of Households Served by Wireline Broadband Service by County

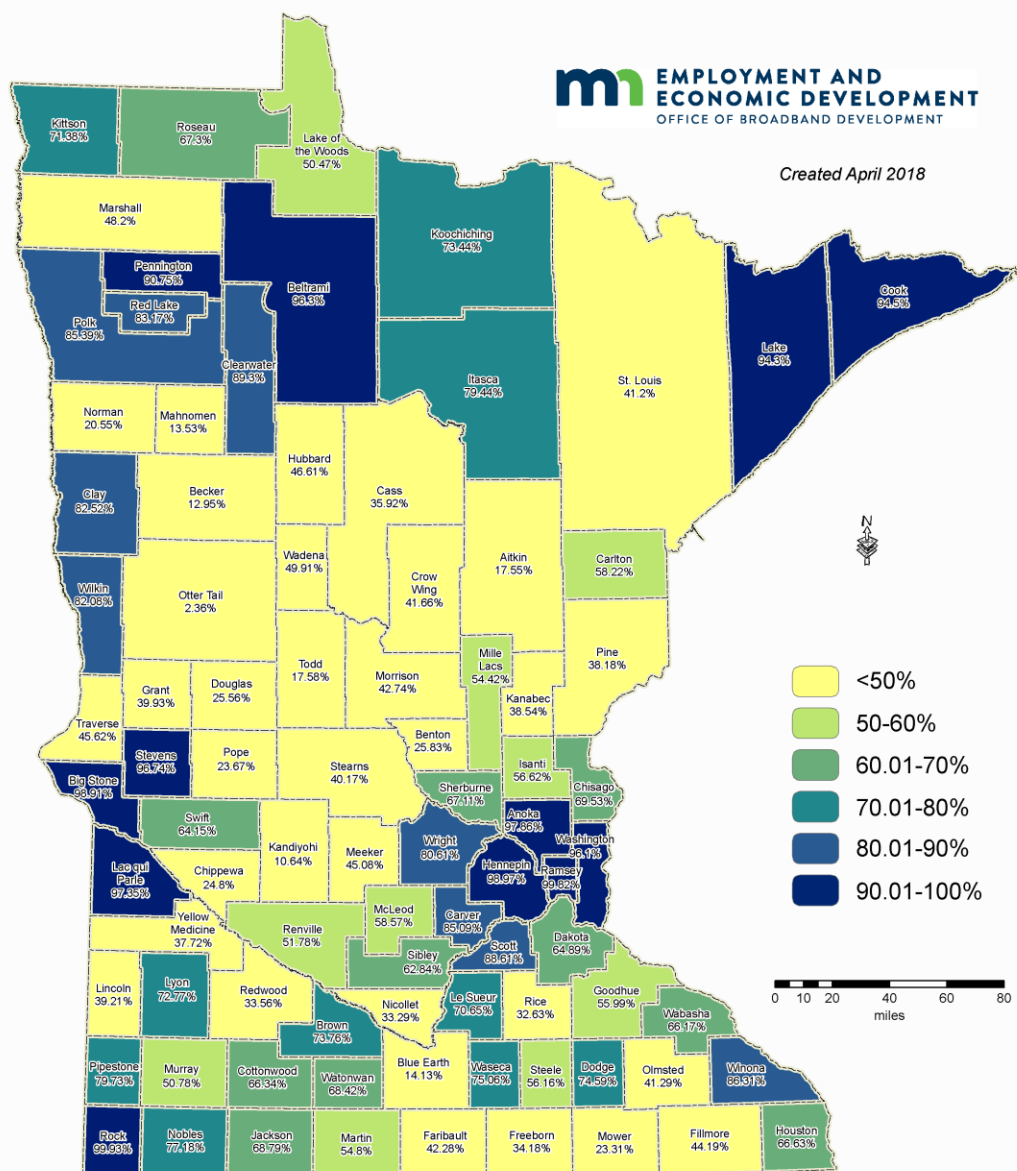
At Least 25 Mbps Download/3 Mbps Upload Speeds
Statewide Availability: 90.77%, Rural: 79.26%



County Map

Percentage of Households Served by Wireline Broadband Service by County

At Least 100 Mbps Download/20 Mbps Upload Speeds
Statewide Availability: 73.66%, Rural: 58.99%



This map was prepared by Connected Nation under contract with the Minnesota Department of Employment and Economic Development. The map represents areas of broadband service availability based on provider data submitted to and analyzed by Connected Nation and modified based on validation tools. The data is current as of December 31, 2017.

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Submit questions or recommended changes to:
DEED.broadband@state.mn.us

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Economic Impact of Broadband Investments in Minnesota

Broadband use helps connect users to opportunities that might not otherwise be available. For example, between 1998 and 2002, communities with broadband availability, compared to those without it, were associated with higher levels of growth in: employment, number of businesses, and number of businesses in the information technology industry.¹¹ Non-metro counties with relatively high levels of broadband adoption (i.e. county-level adoption rates greater than 60 percent) “had significantly higher levels of growth in median household income and significantly reduced growth in unemployment when compared with otherwise similar counties that did not meet this threshold.”¹² Higher download speeds (i.e. greater than 10 Mbps) in rural areas are also associated with poverty levels 2.6 percentage points lower than similar areas without broadband.¹³

A 2017 report by the Internet Innovation Alliance (IIA) notes that access to the Internet is associated with an American household saving, on average, \$12,063.19 per year.¹⁴ This figure takes into account the cost of connecting to the Internet as well as data plans for mobile devices. The savings arise from consumers shopping online, including online-only discounts and comparison shopping. The gross consumer savings associated with online shopping is \$13,219.63 per year. In 2015, the last year that IIA released its estimate, the annual savings was estimated to be \$10,500.¹⁵

Minnesota is viewed by others as an exemplary model of a State-led broadband expansion initiative. At least 18 states are formally looking at the “Minnesota Model,” including establishing a Broadband Task Force, statutory speed goals, an Office of Broadband Development, robust state mapping and the state-funded Border to Border broadband grants program.

The decision to place the Office of Broadband Development within the Department of Employment and Economic Development, highlights the role of broadband in the state’s economic vitality and prosperity. Another part of the “Minnesota Model” is broad recognition that broadband expansion requires Public Private Partnerships. Private providers have the technical expertise to expand broadband but often cannot make the business case necessary to invest in upgrades or expansions in areas with low population density. Public partners can invest in riskier projects or projects with slower return on investment.

In 2017, the Blandin Foundation considered five rural communities to track the economic impact of public investment in better broadband. Using third party data (Census), established economic formulas and interviews with local residents, the study found that community members benefitted from better broadband.¹⁶

¹¹ Lehr, W., Osorio, C., and Gillett, S. (2005). Measuring broadband’s economic impact. Presented at the 33rd research conference on communication, information, and internet policy (TPRC), Arlington, VA, http://www.andrew.cmu.edu/user/sirbu/pubs/MeasuringBB_EconImpact.pdf.

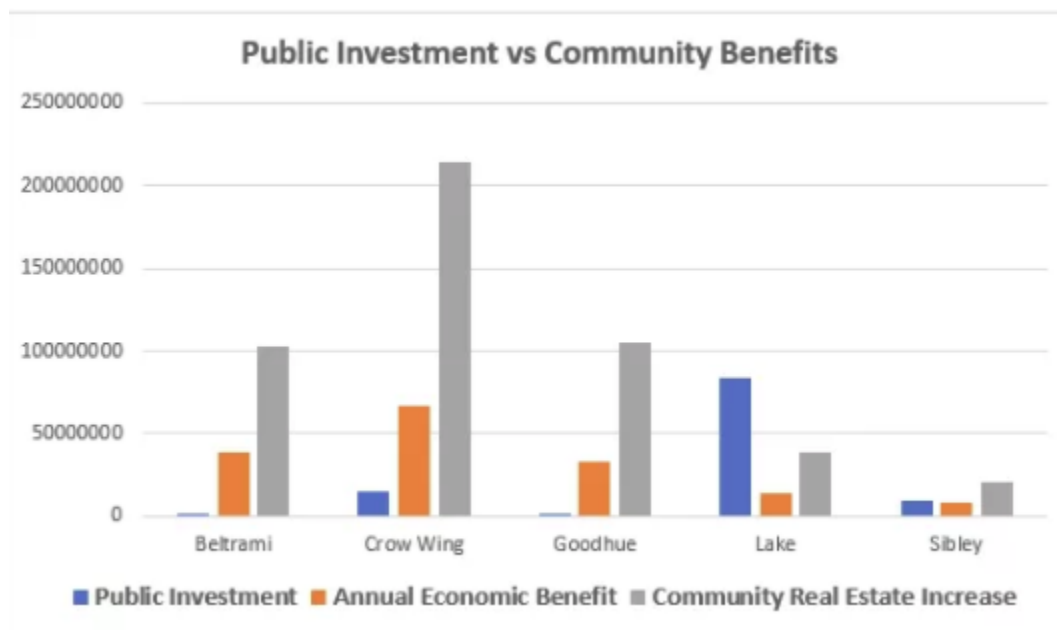
¹² Whitacre, B., Gallardo, R., and Strover, S. (2014). Broadband’s contribution to economic growth in rural areas: Moving towards a causal relationship. *Telecommunications Policy*, <http://dx.doi.org/10.1016/j.telpol.2014.05.005>.

¹³ Whitacre, B., Gallardo, R., and Strover, S. (2014). Broadband’s contribution to economic growth in rural areas: Moving towards a causal relationship. *Telecommunications Policy*, <http://dx.doi.org/10.1016/j.telpol.2014.05.005>

¹⁴ <https://internetinnovation.org/special-reports/savings/>, accessed August 9, 2018.

¹⁵ <http://www.internetinnovation.org/press-room/broadband-news-press-releases/ia-report-consumers-can-set-aside-10500-annually/>, accessed October 27, 2016.

¹⁶ The entire study can be found at: <https://blandinfoundation.org/programs/expanding-opportunity/broadband/report-measuring-impact-broadband-5-rural-mn-communities/>.



The study concluded that economic developers and community leaders in communities with relatively good broadband can focus on implementing innovative, technology-based economic development strategies. The chart above illustrates the economic impact on the communities studied.

Other cities such as Watson, Minnesota, used the Border-to-Border Broadband Grant Program. The City of Watson in Chippewa County, for example, partnered with Farmers Mutual Telephone Company (FMTC) and the Upper Minnesota Valley Regional Development Commission (UMVRDC) on an application for broadband throughout the city and to unserved areas of Lac qui Parle County. The city planned to contribute \$400,000 toward the \$1.55 million project, with \$760,500 in funding from the Border-to-Border Broadband Grant Program and FMTC contributing the remaining \$791,500. The project will connect approximately 156 locations with broadband.

As communities recognize the economic benefits of broadband and consider how to expand broadband to their residents, local governments are exploring creative options to finance these projects. In one case, Swift County partnered with Federated Telephone Cooperative (FTC) in 2015 to apply for and secure a grant in the amount of \$4.95 million from the Border-to-Border Broadband Development Grant Program. To avoid the uncertainty of future interest rate increases via private financing, Swift County sold \$7.8 million in general obligation tax abatement bonds, lending the proceeds to FTC at the prevailing interest rate. When completed, the project was under budget by nearly \$1 million, which was returned to the State of Minnesota.

“Numerous businesses responded through letters of support that this will help them create jobs and be more competitive. New jobs related to farming, home-based start-ups, commercial expansions, and new non-employers are all possible with broadband infrastructure.”

“Farmers Mutual Telephone Company, City of Watson and SW Lac qui Parle County Fiber Connectivity Project,” UMVRDC newsletter

The impact of broadband and Minnesota's grant program is felt throughout the state. Without the grant program, it is clear that some areas of the state would not currently have access to broadband. This Task Force has tried to help provide information to policymakers and the public on the benefits of broadband, and has tried to raise awareness and draw attention to the economic disadvantages for communities that lack access to broadband.

We recognize that changes in technology and broadband policy, particularly at the federal level, affect the broadband policies that Minnesota develops and adopts. We address these issues in the following section.

Issues on the Horizon: How Changes in Technology and Policy Impact Access to Broadband

Changes in technology and federal policy affect—or should affect—how Minnesota responds to the objective of expanding broadband throughout the state. Developments in technology might yield novel devices or technological solutions to once stubborn problems, or might result in breakthroughs that advance the progress of existing technologies. Changes in federal policies, and their related interaction with state policies, might affect how state address particular policy issues. Furthermore, as the laboratories of democracy, states might experiment with novel policy solutions to specific challenges. This section considers changes in technology, federal policy and potential changes to state policy.

Changes in Technology

Before we touch on a few alternative broadband delivery options, we want to provide a brief update on the traditional delivery options – what is happening with Fiber technology and updates to cable's DOCSIS protocol. For more details about the technology please see the [Task Force's 2015 Annual Report](#).

Fiber Technology

Fiber optics was first used as a telecommunication medium in the late 1970s. The first live telephone traffic over this technology was sent in 1977 in Long Beach, California at a speed of 6 Mbps. The technology leverages transmitters on one end that translate an electrical signal into an optical signal, and receivers on the other end that converts this signal back to an electrical signal. In between the transmitter and receiver are bundles of fiber optic cable that stretch for 40-60 miles. These bundles can be attached to amplifiers that enable signals to travel great distances.

Most of today's fiber-optic infrastructure can handle speeds of at least 10 Gbps. Infrastructures that interconnect and aggregate traffic can handle speeds up to 400 Gbps. The increase in speed is achieved via upgrades to the transmitters, receivers, or amplifiers along the fiber routes.

Fiber technology continues to evolve. Laboratory environments have shown new technologies capable of reaching speeds of 250 terabits-per-second (Tbps). While we are still a few years away from this technology being deployment-ready, fiber continues to have a long-term future delivering voice, video, and data.

DOCSIS

DOCSIS is the cable industry standard for enabling high-bandwidth data delivery over cable systems. This standard has allowed cable providers to add voice and data as service offerings to their video customers

using their hybrid fiber-coax (HFC) infrastructures. In its ten plus years of existence, DOCSIS has evolved from providing theoretical maximum speeds (down/up) of 40Mbps/10Mbps to 10Gbps/10Gbps with the latest (3.1 Full Duplex) version of the standard defined in late 2017.

In the future, cable providers will have the opportunity to invest in their networks to enable 3.1 Full Duplex support and be able to deliver faster speeds to their customers.

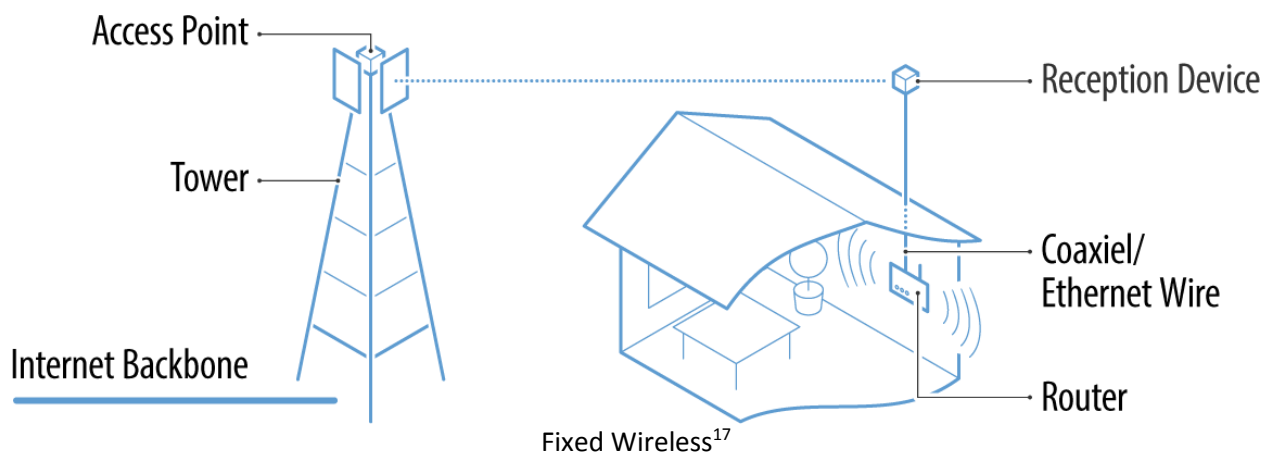
Alternative Broadband Options

While many urban areas have access to at least one traditional broadband carrier, rural areas are more likely to be left with a slow speed option or no option at all. As of April 2018, 21 percent of rural Minnesotans did not have access to a broadband service that meets our current goals of 25 Mbps download/3 Mbps upload (25 Mbps/3 Mbps).

The population density of these rural areas makes providing this service via traditional funding models nearly impossible to justify without some subsidies to help defray costs. To fill this gap, we examined four delivery options that also play a role in serving rural areas. We discuss some of the benefits and challenges below.

Fixed Wireless

Fixed wireless enables two fixed locations to communicate with each other. Instead of a physical connection like you would have with a copper, fiber-coax or fiber connection from a traditional broadband provider, service is delivered over airwaves between the two locations.



Since fixed wireless does not require a physical transport to the end location, it can be faster to deploy and has a much lower last mile installation charge compared to other traditional broadband offerings like DSL or cable. Service speeds and latencies are generally comparable to traditional offerings.

Fixed wireless requires line of sight between the access point and the end location. This can limit its availability in certain locations or under certain weather conditions. There are also concerns about the lack of available spectrum needed to reduce the risk of interference.

¹⁷ <https://broadbandnow.com/Fixed-Wireless>.

The Task Force heard from four fixed wireless providers serving parts of Minnesota, North Dakota, South Dakota and Wisconsin. They see the technologies as being essential to each other. First, most towers are connected to upstream networks via a fiber build to the tower (see Fixed Wireless diagram). Second, instead of having the high costs of trenching miles of fiber into every end location, fixed wireless can be used to extend existing fiber buildouts. In other words, fiber supports fixed wireless, and fixed wireless extends the reach of fiber.

Mobile Wireless

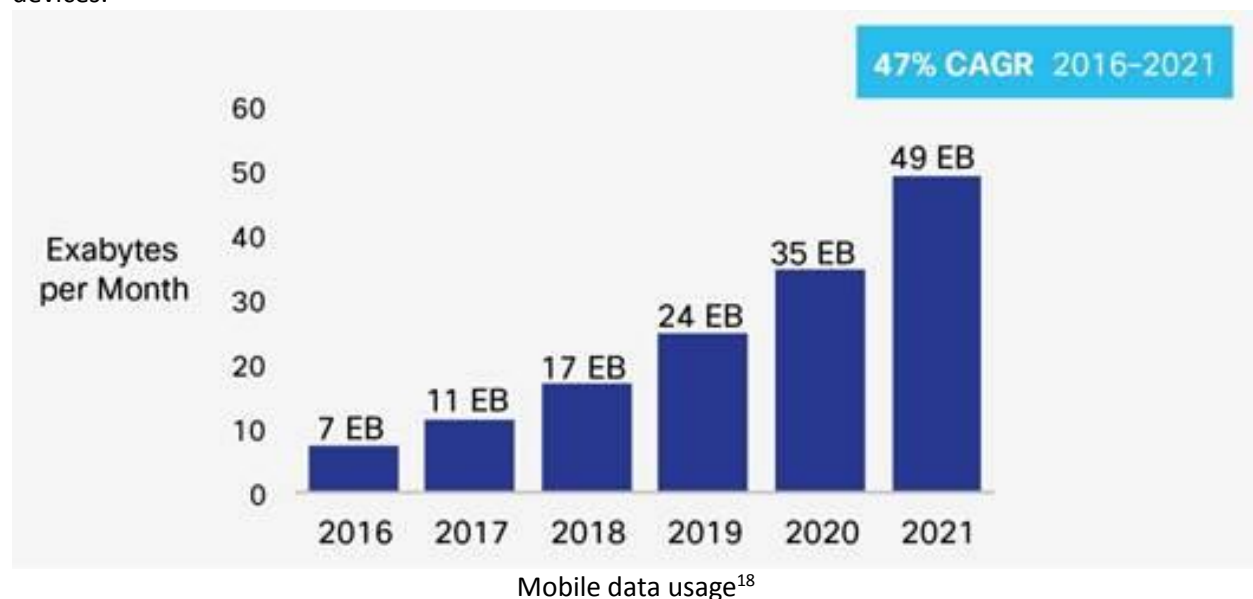
Mobile wireless delivers broadband to devices through cell towers. It can be used for many traditional broadband uses like checking emails, watching a movie or creating mobile hotspots to share broadband access across multiple devices in a home or school.

A potential issue with mobile wireless is that customers often run into data cap issues. This means either an additional charge or a reduction in speeds once a specific capacity has been reached. This can make mobile wireless an expensive option if it is used as an individual or family's primary broadband solution.

5G

Previous generations of mobile wireless were geared toward delivering voice and data to mobile handsets. They were designed to leverage the original cellular network architecture where cell towers served geographic areas of several miles.

Today, mobile data usage is growing dramatically year-over-year. Cisco predicts that in just five years, mobile data traffic is expected to grow at a compound annual growth rate (CAGR) of 47 percent. The growth in traffic is due to the boom in mobile video as well as the increase in Internet of Things (IoT) devices.



¹⁸ <https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html>.

Connected devices are also seeing a significant growth surge. Gartner predicted that by the end of 2017, there are expected to be 8.4 billion devices connected to the Internet. By 2020, this number is projected to be more than 20 billion.¹⁹ Vehicles, watches, packages, medical devices, and drones are just a few of the devices that will need to connect to the network for sending and receiving data.

To meet this anticipated surge, mobile wireless is moving to its fifth generation or 5G.

5G networks are being designed to have additional capacity for mobile devices, handle all of the additional IoT devices that will be seeking connections, and provide faster speeds. Once this technology is fully deployed, mobile networks will have a much better chance of meeting the state's broadband goals.

5G networks will also have the capability of utilizing many additional spectrum ranges. Lower ranges of the spectrum can be used to cover greater distances while higher ranges enable more bandwidth. This spectrum flexibility will allow 5G to increase coverage and bandwidth for fixed wireless offerings.

Today's mobile networks include more than 300,000 cells to provide coverage across the US. Each cell covers an area of roughly 1-2 miles. 5G leverages small cells which cover a much smaller area—typically less than one mile. The smaller coverage area requires many more cells spread out to provide coverage across the US. Accomplishing this means millions of small devices installed on lamp posts, buildings and across neighborhoods which will take time and additional investment.

High-density population areas will be the first to take advantage of 5G capabilities. Multiple carriers successfully used 5G to provide increased capacity and coverage around the Twin Cities in anticipation of Super Bowl LII.

4G coverage has expanded to Rural and other lower-density population areas more slowly than urban areas. The smaller coverage areas of 5G will mean that it will likely be sometime before smaller towns and agricultural areas can take advantage of its benefits.

5G is dependent on a robust fiber network, because these small cells need to interconnect with fiber, which provides high speed and capacity connections to the small cells. This means that the 5G networks of tomorrow will be some of the “most wired” wireless networks ever deployed.

The American Consumer Institute recently released a report confirming the economic and consumer benefit of 5G networks. The study shows an expected benefit of \$533B to U.S. GDP over seven years and \$1.2T in long-run consumer benefit.²⁰

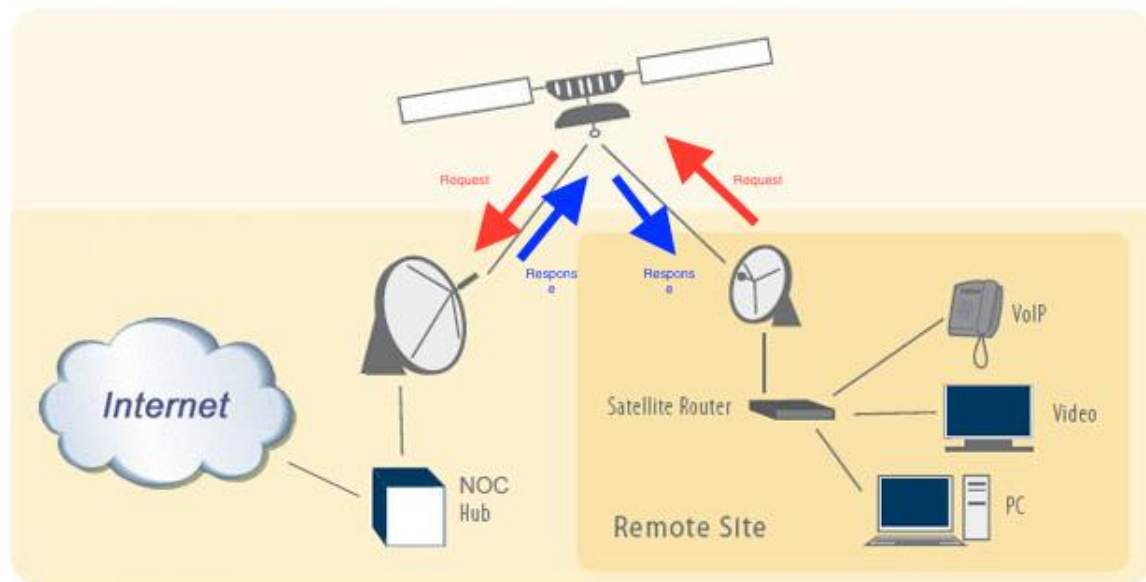
Satellite-based Broadband

Six years after the launch of Sputnik 1, NASA launched a satellite that was able to orbit the Earth above the equator and remain in a fixed position. The concept of a geosynchronous orbit paved the way for satellites that can be adapted for television and communications delivery. Over the years, satellite

¹⁹ <https://www.gartner.com/en/newsroom/press-releases/2017-02-07-gartner-says-8-billion-connected-things-will-be-in-use-in-2017-up-31-percent-from-2016>.

²⁰ <http://www.theamericanconsumer.org/2018/07/morning-consult-5g-is-coming-and-states-need-to-be-ready/>.

delivery has evolved to provide an option for Internet connectivity for users who are outside the coverage area of traditional broadband and wireless providers.



Satellite Internet²¹

The satellite acts as a connection pathway between the remote site (home or business) and the network operations center (service provider location). In this case, the connection is 22,000 miles “up to” and “down from” the satellite.

Internet delivery via satellite is available just about everywhere with over 1.7M U.S. subscribers. Satellites launched in 2016-17 now enable speeds of 25 Mbps/3 Mbps which will allow most applications to function like they would on broadband from cable or DSL.

All satellite traffic needs to travel nearly 100,000 miles (two trips up to and two trips down from the satellite). The distance introduces a high amount of latency which can impact applications like voice-over-IP, video conferencing and gaming. The FCC is working with providers on a next-generation satellite offering which may be able to minimize this impact by leveraging non-geostationary satellites at lower orbits.

Data caps pose an ongoing challenge. Some traditional broadband and fixed wireless providers also use data caps, but satellite capacity limitations require satellite providers to utilize lower data caps. Previously, these limits were hard caps that you could either not exceed or exceed with significant overage charges. For example, HughesNet’s website informs customers that while there may be no cost to exceed the cap, after exceeding the cap speeds may go down to less than 3 Mbps.²²

²¹ http://www.groundcontrol.com/How_Does_Satellite_Internet_Work.htm.

²² <https://www.hughesnet.com/taxonomy/term/831>

The size of the satellite caps range from 10-150 GBs. This may seem like an adequate amount of data, but iGR Research²³ reported last year that the average monthly broadband usage per household is 190 GBs while both AT&T²⁴ and Comcast²⁵ claim that their average home Internet users consume at least 100 GBs of data per month. This demonstrates that while today's satellite internet offerings can fill the coverage gap, they still may not meet the data usage needs of the average household.

TV Whitespace

Telecommunication broadcasters are required to obtain a license which enables them to broadcast at a particular frequency over a specific distance. A buffer around this frequency is also reserved to prevent interference from other broadcaster or devices using nearby frequencies.

Before June 2009, television stations broadcast their signals in analog across a wide range of frequencies. Once stations switched to digital broadcast, they were able to squeeze more channels into smaller frequency ranges, thus making large ranges available for other uses. Since then, network operators have been looking at ways to take advantage of this space between the ranges or "whitespace" (TVWS).

One promising idea is the use of TVWS to deliver broadband services. Base stations could be set up at points with high-capacity connectivity. These base stations would then broadcast to multiple, individual locations. Advantages of using the TVWS include coverage at longer distances, better penetration at each location, and installation/CPE costs similar to fixed wireless solutions.

²³ https://igr-inc.com/advisory-subscription-services/wireless-mobile-landscape/us_home_broadband_wifi_forecast_2020.asp.

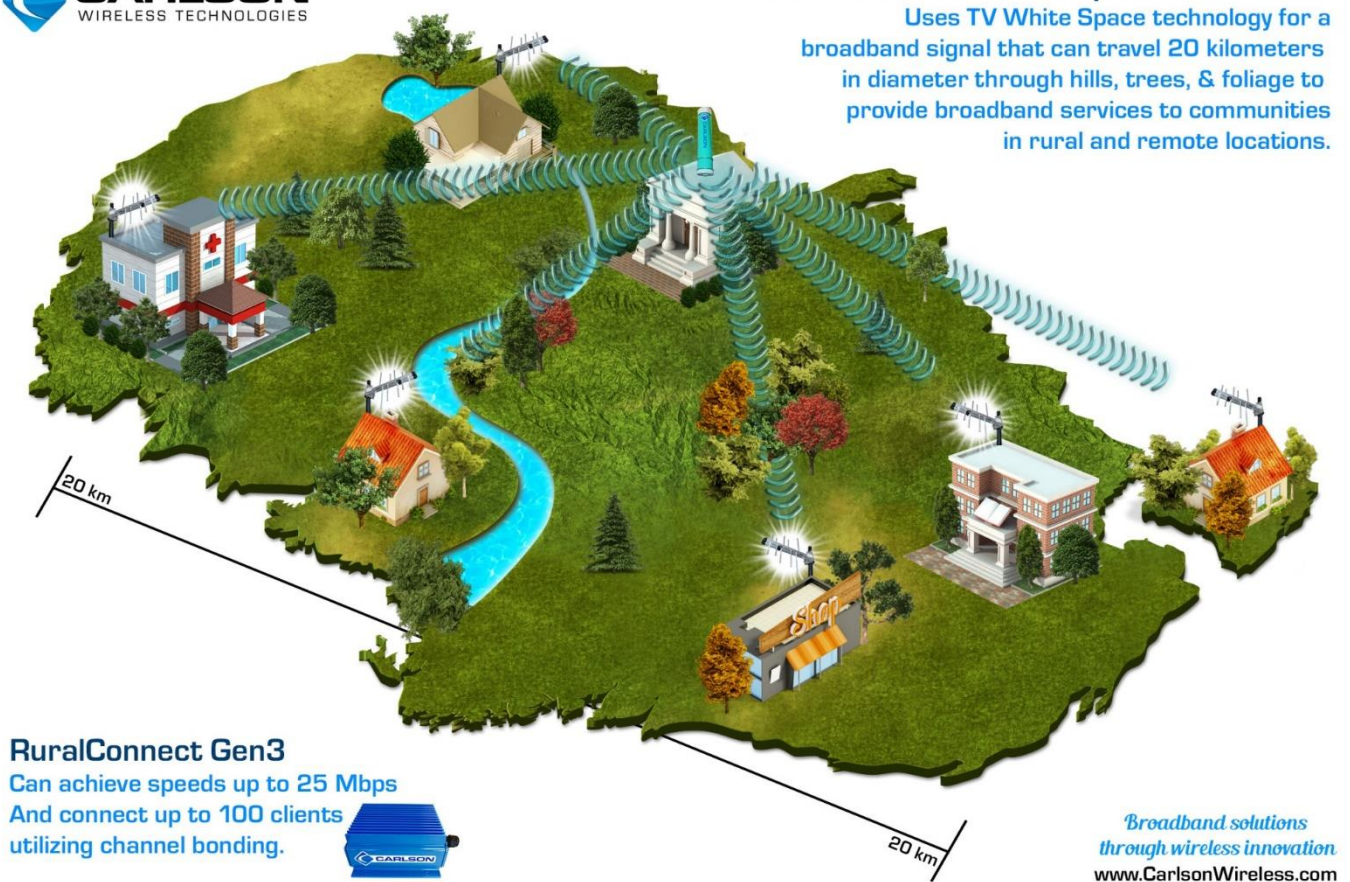
²⁴ <https://www.att.com/esupport/article.html#!/dsl-high-speed/KM1010099>.

²⁵ <https://www.xfinity.com/support/internet/data-usage-average-network-usage/>.



RuralConnect TV White Space Radio Gen3

Uses TV White Space technology for a broadband signal that can travel 20 kilometers in diameter through hills, trees, & foliage to provide broadband services to communities in rural and remote locations.



TV Whitespace Overview²⁶

Currently, TVWS is in a pilot stage in the U.S. and other countries. There are permitting and equipment manufacturing issues to resolve for this technology to deliver at large scale. One project in the works is Microsoft's Airband Initiative. The project has launched a number of pilots across 24 countries and this year announced a plan to deliver 12 TVWS projects to 12 states in 12 months with a long-term goal of connection 2 million rural Americans to TVWS by 2022.

Though the primary delivery mechanisms are wireless, many of the technologies highlighted here rely on a fiber network. Some of these technologies, such as TVWS, are new; others have experienced significant advances in the last few years. With a rapidly evolving technology landscape, policymakers should continue to examine and take into account the variety of technological approaches to delivering broadband. Indeed, the Task Force remains neutral with respect to the technological platform that is used to deploy broadband but is interested in being aware of technology changes that could affect the delivery of broadband.

²⁶ <http://www.carlsonwireless.com/wp-content/uploads/2018/04/RuralConnect-Gen3-US-03-28a-18-Print-Book-r.pdf>.

Security of Alternative Broadband Options

Since many of the previous alternatives to broadband are “wireless,” some people wonder if this makes it easier for hackers to listen in on the signals and potentially steal data. The fact the signal is transmitted over does not significantly affect how insecure the signal is. Experts agree that no matter how the signal is transmitted, the infrastructure must receive the proper security patches and that encryption of the data is the real key to prevent exposing sensitive data via wireless or wired networks.

Whether the broadband connection is wired or wireless, there are steps users can take to enhance security while online. The U.S. Department of Homeland Security has a “Stop. Think. Connect” campaign (www.stopthinkconnect.org) which provides some of these tips to online users (see Appendix B for details of the “Stop. Think. Connect” cybersecurity tips).

Summary of Alternative Broadband Options

	Overview	Strengths	Challenges ²⁷
Fixed Wireless	<ul style="list-style-type: none"> • Uses airwaves to provide communications to a fixed endpoint 	<ul style="list-style-type: none"> • Quick to install • Lower last mile costs 	<ul style="list-style-type: none"> • Line of sight required • Weather sensitivity • Competition for available spectrum
Mobile Wireless	<ul style="list-style-type: none"> • Uses airwaves to provide communication to an endpoint that is mobile 	<ul style="list-style-type: none"> • Simple to install and activate • Wide acceptance rate 	<ul style="list-style-type: none"> • Current speeds well below state broadband goals • Potentially restrictive data caps
5G	<ul style="list-style-type: none"> • Next-generation wireless technology expected to help satisfy growing mobile data and device needs 	<ul style="list-style-type: none"> • May achieve state broadband goals • Leverages existing mobile network cells to seed deployment 	<ul style="list-style-type: none"> • Additional installation work/cost due to need for more cells • Will initially be available in high-density population markets
Satellite-based	<ul style="list-style-type: none"> • Leverages satellite signals to deliver Internet via between end point and service provider 	<ul style="list-style-type: none"> • Quick to install • Lower last mile costs 	<ul style="list-style-type: none"> • Line of sight required • Weather sensitivity • Latency-sensitive applications may be impacted • Restrictive data caps • Higher monthly rates compared to wireline at same speed
TV Whitespace	<ul style="list-style-type: none"> • Delivers Internet via unused spectrum previously allocated to analog television signals 	<ul style="list-style-type: none"> • May provide coverage at longer distances than other over-the-air delivery methods and lower density • Can more easily penetrate individual locations 	<ul style="list-style-type: none"> • Still in development, licensing, and deployment

Emerging Technologies

In previous Task Force reports, we have reported on many ways that Minnesota residents are taking advantage of broadband services. We have discussed the growth of the freelance employment, the advantage of telecommuting options for full-time employees, the increased use of broadband in education and library systems and the applications requiring broadband in the field of telemedicine. This report touches on new technologies and their reliance on broadband.

²⁷ Costs vary by services and packages and make generalizations difficult.

Precision Ag

The need for broadband in agriculture continues to climb. According to a study by Alpha Brown, by the end of 2017, there were over 250,000 farmers using Internet of Things (IoT) sensors to monitor portions of their business.²⁸ The growth possibilities include up to 1.1 million farms with a \$4 billion market size.

In addition to sensors, drones are being used to monitor field moisture to more accurately direct irrigation and to ensure chemicals are only applied where needed. Today, some sensors monitor cows that are about to give birth, report on dairy cow's biological measurements, and measure moisture and pest presence in fruit orchards. Even the equipment used by farmers continue to be enhanced with sensors. The Task Force visited CNH in Benson, Minnesota to learn about the increased use of near real-time sensors in the equipment they manufacture.

The Task Force also heard from Minnesota-based Multi-Tech Systems, which uses lower power wireless area networks to transmit data from IoT sensors that can improve both the yield and efficiency of agriculture by measuring: soil moisture and nutrients, the movements of animals, or the consumption of feed and water for livestock.

All of these sensors are using and generating significant amounts of data. They need to have reliable broadband connectivity to enable Minnesota farmers to take advantage of their production-enhancing promises.

Blockchain

Another technology that the Task Force reviewed in 2018 was Blockchain. This technology is an encrypted, decentralized ledgering system that provides decentralized, immutable ownership. The technology can be used to enable smart contracts, asset transfers or payments (i.e., Bitcoin). It has the potential to reduce the cost of verification.

Walmart and IBM are partnering on a way to use Blockchain to track products from farm to consumer to help combat food fraud. Maersk is also partnering with IBM to leverage Blockchain to create tamper-resistant digital shipping paperwork to aid shipping supply chains. Governments are also looking to solve problems with Blockchain. The country of Georgia is using it to secure and record land transfers and Estonia is using Blockchain to create a digital identity of its citizens. Illinois is leveraging Blockchain to pilot programs to register land titles in Cook County and develop a renewable energy credit system for the Illinois Pollution Control Board. While this technology itself is not a high user of broadband resources, high-quality broadband connectivity will be necessary for companies, residents and the government entities in Minnesota to take part in the advances made with this technology.

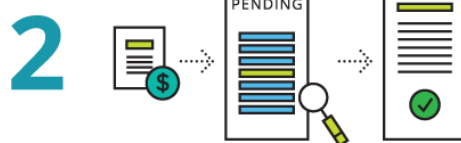
²⁸ <https://www.prnewswire.com/news-releases/250000-farmers-in-the-us-are-already-utilizing-iot-solutions-and-the-potential-market-size-is-over-one-million-users-and-4-bl-per-year--a-new-ag-tech-study-by-alpha-brown-reveals-300643461.html>

Figure 2. Blockchain: How it works

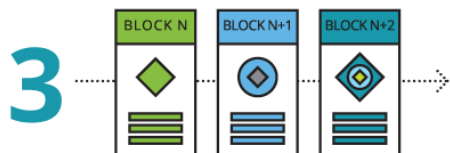
Blockchain allows for the secure management of a shared ledger, where transactions are verified and stored on a network without a governing central authority. Blockchains can come in different configurations, ranging from public, open-source networks to private blockchains that require explicit permission to read or write. Computer science and advanced mathematics (in the form of cryptographic hash functions) are what make blockchains tick, not just enabling transactions but also protecting a blockchain's integrity and anonymity.



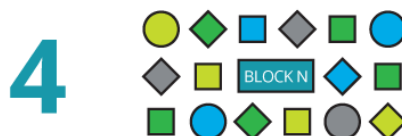
TRANSACTION Two parties exchange data; this could represent money, contracts, deeds, medical records, customer details, or any other asset that can be described in digital form.



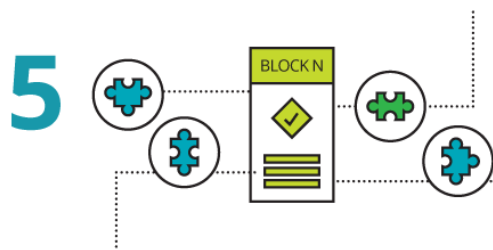
VERIFICATION Depending on the network's parameters, the transaction is either verified instantly or transcribed into a secured record and placed in a queue of pending transactions. In this case, nodes—the computers or servers in the network—determine if the transactions are valid based on a set of rules the network has agreed on.



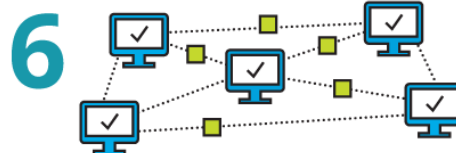
STRUCTURE Each block is identified by a hash, a 256-bit number, created using an algorithm agreed upon by the network. A block contains a header, a reference to the previous block's hash, and a group of transactions. The sequence of linked hashes creates a secure, interdependent chain.



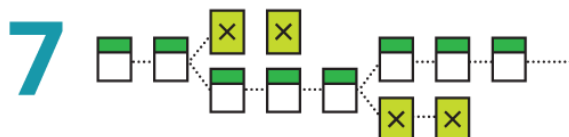
VALIDATION Blocks must first be validated to be added to the blockchain. The most accepted form of validation for open-source blockchains is proof of work—the solution to a mathematical puzzle derived from the block's header.



BLOCKCHAIN MINING Miners try to “solve” the block by making incremental changes to one variable until the solution satisfies a network-wide target. This is called “proof of work” because correct answers cannot be falsified; potential solutions must prove that the appropriate level of computing power was drained in solving.



THE CHAIN When a block is validated, the miners that solved the puzzle are rewarded and the block is distributed through the network. Each node adds the block to the majority chain, the network's immutable and auditable blockchain.



BUILT-IN DEFENSE If a malicious miner tries to submit an altered block to the chain, the hash function of that block, and all following blocks, would change. The other nodes would detect these changes and reject the block from the majority chain, preventing corruption.

Source: Deloitte Tech Trends 2016, *Blockchain: Democratized Trust*.

Deloitte University Press | dupress.deloitte.com

An Overview of Blockchain

Telehealth

Consumers also feel the impact of broadband in healthcare, an area of broadband use that has experienced growth over the last few years. Telemedicine helps patients connect with their doctors virtually, helping patients connect with specialists they might not otherwise have access to, while also making the visit more convenient for patients in rural areas or those who have difficulty traveling.

Minnesota hospitals released best practice guidelines for patients released from the hospital or emergency room with an acute heart failure. These guidelines include using telehome monitoring devices for these patients, which includes the use of scales to download (via Bluetooth and broadband) daily weights to a hospital's heart center where nurses react using medical protocols for that patient. The nationwide average for readmission is 23 percent, but these Minnesota hospitals are experiencing a low 1-2 percent readmission rate. The Minnesota Veterans Affairs facilities are also using this technology for their heart patients.

Cybersecurity

Every day there seems to be another news article about stolen data, ransomware taking over systems and encrypting data or identity theft occurring. To provide some context, Verizon published its annual Data Breach Investigation Report²⁹ reviewing 53,000+ global security incidents resulting in 2,200+ data breaches. While the report has many interesting statistics, there are two that we want to highlight: (1) public sector systems were ranked third for the number of breaches in 2017, and (2) while compromises typically take just minutes to execute upon breaching the system, most take months to discover.

We mention these to highlight the importance of the work going on within MNIT. The commissioner of MNIT and Minnesota's Chief Information Officer (CIO), Brig. Gen. Johanna Clyborne, and the state's Chief Information Security Officer (CISO), Aaron Call, presented to the Task Force on the topic of cybersecurity. They discussed some of the initiatives MNIT is taking with regard to updating the security policies and security training, to begin to ensure systems are being developed from the beginning to be as secure as possible and to educate state employees about what to do to combat the many attempts at social engineering or what to do if they see suspicious activity. Both of these steps help to improve the security posture of the state's systems and data.

Recommendations

1. Continue to understand the advances in technology that will drive both the demand for better broadband access and that will enable the delivery of broadband access to its citizens.
2. Establish a legislative cybersecurity commission to enable information-sharing between policy-makers, state agencies, and private industry related to Minnesota's cybersecurity infrastructure, cybersecurity workforce issues and emerging technology, whose scope of work includes: (a) developing legislation to support and strengthen Minnesota's cybersecurity infrastructure, and (b) providing input or recommendations related to developing a multi-year strategic plan to secure Minnesota's IT environments.

²⁹ https://www.verizonenterprise.com/resources/reports/rp_DBIR_2018_Report_execsummary_en_xg.pdf.

Federal policy: Future challenges and opportunities

Developments at the Federal Communications Commission (FCC) continue to impact broadband deployment and adoption in Minnesota.³⁰ Federal investment in telecommunications has evolved significantly over recent years. Programs aimed at improving broadband access for rural health care, education and public safety bring substantial funds into the state. This section highlights how federal efforts impact Minnesotans.

The Connect America Fund (CAF) provides substantial funding directly to telecommunications carriers who serve high cost rural communities. The FCC conducted a reverse auction in July and August 2018 to award \$1.98B over a ten-year period.³¹ The funding is available in areas where the carrier declined CAF support in 2015 and there is no broadband available of at least 10/1 Mbps.³² Several Minnesota carriers participated in the auction and were awarded annual support of approximately \$3.9M.³³ Over the next ten years, this support should connect almost 12,000 Minnesotans to broadband service at a speed of at least 10 Mbps/1 Mbps. Congress supplemented the traditional high cost program with a one-time \$600M infusion for rural areas of less than 20,000 residents where at least 90 percent of homes lack broadband.³⁴ The pilot program, administered by the USDA's Rural Utilities Service, will provide a combination of grants and loans to promote the deployment of broadband.

Public safety networks depend on access to robust telecommunications services.³⁵ Congress created the FirstNet program to deliver secure, dedicated wireless network services to public safety providers. Minnesota finalized its contract with FirstNet in May 2018.³⁶ Minnesota law enforcement, fire, emergency medical personnel and sovereign nations may now sign up.³⁷ "FirstNet offers priority, preemption and reliability during emergencies like the Interstate 35 bridge collapse or the recent refinery explosion in Superior, Wisconsin," said Emergency Communication Networks Director Dana Wahlberg. "Duluth responders provided mutual aid to the refinery explosion and experienced congestion on the wireless network during the incident."³⁸ This congestion won't happen when FirstNet is operational.

Rural health care facilities in Minnesota benefit from federal support to reduce the high cost of accessing broadband in sparsely populated areas. Critical functions in hospitals, clinics, labs and medical provider offices are intricately reliant upon reliable, high speed broadband. The FCC recently expanded the cap for the Rural Healthcare Program from \$400M to \$571M in recognition of increasing demand for

³⁰ Danna Mackenzie, Director of the Office of Broadband Development, was recently appointed by FCC Chairman Pai to serve on the full Broadband Deployment Advisory Committee. <https://docs.fcc.gov/public/attachments/DA-17-476A1.pdf>.

³¹ <https://www.fcc.gov/auction/903>.

³² A map of eligible areas is available on the FCC website. <https://www.fcc.gov/maps/caf2-auction-final-areas/>.

³³ <https://docs.fcc.gov/public/attachments/DA-18-658A2.pdf>.

³⁴ <https://www.usda.gov/sites/default/files/documents/usda-fy19-budget-summary.pdf>.

³⁵ <https://firstnet.gov/about>.

³⁶ <https://dps.mn.gov/divisions/ecn/programs/wireless-broadband/Pages/default.aspx>.

³⁷ The Task Force heard from a panel including FirstNet Board Member Hennepin County Sheriff Richard Stanek, AT&T FirstNet Coordinator Corey Draack and Melinda Miller from the Emergency Communications Network division of the Minnesota Department of Public Safety at its April 2018 meeting. https://mn.gov/deed/assets/first-net_tcm1045-334395.pdf; https://mn.gov/deed/assets/mndps-first-net_tcm1045-334394.pdf.

³⁸ <https://dps.mn.gov/divisions/ooc/news-releases/Pages/dedicated-broadband-minnesota-responders-now-available.aspx>.

support. FCC Chairman Ajit Pai stated, “Telemedicine is vital in many communities that may not otherwise have access to high-quality health care, and the Federal Communications Commission has an important role in promoting it.”³⁹ Chairman Pai also proposed a pilot program to promote the use of broadband-enabled telehealth services among low-income families and veterans.

Minnesota students and educators incorporate technology into learning done in the classroom and at home. “Innovative digital learning technologies and the growing importance of the Internet in connecting students, teachers and consumers to jobs, life-long learning and information, are creating increasing demand for bandwidth in schools and libraries.”⁴⁰ The federal E-Rate program provides discounts to broadband services to school district facilities and libraries throughout the state, especially in rural areas.⁴¹ The Task Force heard from Education SuperHighway in May 2018 about the progress the E-Rate program has generated for K-12 institutions in Minnesota.⁴² According to the presentation, “Only a handful of districts remain that are not meeting fiber and bandwidth metrics.”⁴³ E-Rate also supports broadband access at public libraries throughout the state. Funded by the state, the Telecommunications Equity Aid and Regional Library Telecommunications Aid programs complement E-Rate funding to provide additional support to schools and libraries but do not support Category 2 services.⁴⁴

State policy: Future challenges and opportunities

An overview of the Border-to-Border Broadband Grant Program and the Office of Broadband Development was provided above. This section discusses other state policy considerations policymakers should keep in mind when developing broadband policy.

State General Obligation Bonding for Fiber Optic Cable Infrastructure

Article XI, Section 5 of the Minnesota Constitution permits the issuance of general obligation bonds for specified purposes, stating in part:

Sec. 5. Public debt and works of internal improvement; purposes. Public debt may be contracted and works of internal improvements carried on for the following purposes:

(a) to acquire and to better public land and buildings and other public improvements of a capital nature and to provide money to be appropriated or loaned to any agency or political subdivision of the state for such purposes if the law authorizing the debt is adopted by the vote of at least three-fifths of the members of each house of the legislature....

Minn. Const. Article XI, § 5.

³⁹ <https://docs.fcc.gov/public/attachments/DOC-351633A1.pdf>.

⁴⁰ <https://www.fcc.gov/general/universal-service-program-schools-and-libraries-e-rate>.

⁴¹ <https://www.fcc.gov/general/universal-service-program-schools-and-libraries-e-rate>.

⁴² https://mn.gov/deed/assets/10-may-2018-esh_tcm1045-339814.pdf.

⁴³ *Id.*

⁴⁴ Category Two services include Internal Connections, Managed Internal Broadband Services, and Basic Maintenance of Internal Connections. <https://www.usac.org/si/applicants/beforeyoubegin/eligible-services-list.aspx>.

State general obligation bonding has not been used for fiber optic cable deployment. A 1994 legal opinion letter⁴⁵ providing guidance to the Minnesota Department of Finance concluded the installation of fiber optic cable would not meet the Section 5 constitutional restrictions of “the acquisition of land or buildings or clearly comprise (1) the betterment of ‘land’ or (2) the acquisition and betterment of ‘other public improvements.’” Id. The 1994 opinion concluded that fiber optic cable, at least as of 1994, was personal property and that the Section 5 “other public improvements of a capital nature” clause “most likely refers to additions to real estate, not personal property.” Id. The letter indicated that unless there was “no doubt” as to the appropriateness of using general obligations for this purpose, a test case would be required before an unqualified opinion could be issued approving bonding for installation of fiber optic cable. Id.

A July 2000 legal opinion letter⁴⁶ updating this legal guidance to the Minnesota Department of Finance included the following opinions as to general obligation bonding:

- Installation of fiber optic cable and connector devices may be eligible “as part of a program of substantial technological upgrade to a building.”
- Routers, switches and other similar devices may be eligible if not routine maintenance and part of technological infrastructure that comprises a capital betterment.
- Cable fiber installed on public land that is not part of a building’s betterment program would not improve the value of the land and would not be eligible.
- Wireless system infrastructure located at state buildings may be eligible as part of a building betterment program, but transmission facilities at separate locations would need to be evaluated on a case-by-case basis.

A March 2010 legal opinion letter⁴⁷ issued to Attorney General Lori Swanson concluded that a bill introduced in the 2009-2010 Legislature (HF 2712) relating to funding of fiber optic infrastructure for schools would be eligible for state general obligation bonding, stating:

It appears to us that the Program Authorizes capital expenditures that include (I) the acquisition or betterment of public land, (II) the betterment of public buildings, or (III) the acquisition of public improvements. * * * While individual projects would need to be analyzed for compliance with applicable constitutional provisions, the Program’s purposes generally comport with the constitutional requirements for the use of general obligation bond proceeds.

Id. The March 2010 opinion letter noted that its updated conclusion was informed by a then recent 2006 Minnesota Supreme Court decision, Lietz v. Northern States Power, 718 N.W.2d 865 (Minn. 2006), as to the characterization of “public improvements.”

General obligation bonds also include a requirement of public ownership. As a general rule, a useful life of at least 10 years is required. During the 2018 legislative session, at least two bills

⁴⁵ Correspondence from bond counsel Thomas S. Hay to Assistant Commissioner of Finance Peter Sausen dated January 5, 1994 (Appendix C).

⁴⁶ Correspondence from bond counsel Leonard S. Rice to Peter Sausen dated July 5, 2000 (Appendix C).

⁴⁷ Correspondence from bond counsel Leonard S. Rice to Attorney General Lori Swanson dated March 17, 2010 (Appendix C).

were introduced that would have expressly provided state general obligation bonding for use in the deployment or maintenance of fiber optic infrastructure.⁴⁸

The Office of Broadband is seeing that some counties bonding for the county's portion of grants under the Border-to-Border Broadband Development Grant Program. County bonding for fiber optic cable installation is not hampered by Article XI, Section 5 restrictions. As far back as 1872, it has been "well settled that the public debt and internal improvement provisions of the constitution apply only to the state, and not its political subdivisions." Lifteau v. Metropolitan Sports Facilities Comm'n., 270 N.W.2d 749, 756 (1978).

In the 21st century world of the Internet-of-things, the Task Force agrees with the characterization of fiber optic cable installation falling within the constitutional ambit of "the acquisition or betterment of public land, buildings, and other public improvements of a capital nature." General obligation bonding is something the state might consider using, for example, to take advantage of existing and upcoming federal broadband programs requiring a match of federal dollars. Further, the advent of driverless vehicles is leading to deployment of accompanying highway technologies and "dig once" initiatives for installation of utilities. As such, general obligation bonding may now also be permissible "to establish and maintain highways." Minn. Const. Article XI, Section 5(e). While not bound by the legislature's characterization of bonds governed by the Minnesota Constitution, the courts will uphold bonding legislation when "the label matches the substance of the transaction." Schowalter v. State, 822 N.W.2d 292, 301 (Minn. 2012).

The Task Force, however, does not believe that general obligation bonding is an adequate or even desirable substitute for the funding of broadband infrastructure projects covered under the state's Border-to-Border Broadband Development Grant Program. The Border-to-Border Broadband Development Grant Program is an effective means for evaluating proposals and assuring that the state's dollars are most effectively being directed toward achievement of Minnesota's broadband goals.

Mapping of Broadband Service Areas in Minnesota

Of the 27 statutory obligations assigned to the Minnesota Office of Broadband Development, measuring and mapping broadband infrastructure deployment in the state is one of the most important. Accurate, timely mapping based on best available data has been a key, well recognized feature of the Minnesota model for development of broadband infrastructure in the state. "Minnesota's maps are better than any other state" is often heard from experts and broadband policymakers. Leaders from other states and institutions seek input and advice from OBD on this issue.

National level bills have been introduced to try and improve the data on cellular and broadband coverage available at the national level. See H.R.4810 MAPPING NOW Act of 2018; H.R.4798 – Inventory of Assets for Communications Facilities Act of 2018. Presently there is no state regulation on data reporting by broadband providers, and self-reporting is an imperfect process, and remains a work in progress. Through a concerted effort, Minnesota has worked to create a culture of trust between broadband providers and the Office of Broadband Development. As a result, Minnesota is fortunate to be in a better position on mapping than most others.

⁴⁸ See SF1602/HF1092; SF3964/HF4376.

The budget set by the legislature for the Border-to-Border Broadband Development Grant Program has included a three percent budget allocation for administering the grant program, including broadband mapping. The Task Force believes mapping is a critical element and obligation of OBD and should receive separate, dedicated funding from the Legislature.

Continued Opportunities to Secure Added State Dollar Value with “Dig Once” Policies and Practices

Installing broadband infrastructure, usually conduit and/or fiber optic cable, in coordination with another trenching project is estimated to reduce the costs of deployment by 30 percent.⁴⁹ Overall, the cost savings of using a dig once approach of installing conduit and fiber optic cable at the same time as other capital projects can result in savings of \$30,000 to \$100,000 per mile of fiber optic cable installed.⁵⁰ Dig once can result in savings in the millions of dollars, greater longevity of streets and highways, and accelerated broadband infrastructure deployment.

Minnesota Statutes § 116J.391 directs the Office of Broadband Development to work with the Department of Transportation and private entities to develop and encourage dig once practices in state right-of-ways and to work with other state agencies to develop a plan for conduit and broadband deployment on state-owned lands and buildings. “[T]o the extent practicable,” the statute also authorizes the Office of Broadband Development to work with local units of government for the same purposes. Dig once efforts are ongoing as to state highway projects.

The Task Force continues to believe there is an area of additional potential significant opportunity for further expansion and coordination of dig once policies and practices with regard to public water and sewer projects funded in part by the Minnesota Public Facilities Authority (PFA), which annually provides millions of dollars to fund these projects. The PFA funded 45 local government infrastructure projects throughout the State in fiscal year 2017 with loan and grant awards totaling \$175 million.⁵¹ Many PFA-funded local government projects are for replacement of aging water and sewer lines involving the complete reconstruction of local streets and highways.

Additional legislation may be necessary to capture these significant opportunities to speed Minnesota’s deployment of broadband infrastructure and save millions of dollars in the process.⁵² Legislation could strike an appropriate balance assuring that dig once policies do not result in barriers, unwanted increased costs, or delays for local government projects. “Continued state funding will allow more cities to take on these essential, and in many cases long-delayed, projects and encourage them to invest in the planning and design work needed to make them ready for construction.”⁵³ Minnesota’s investment of hundreds of millions of dollars in these projects would have greater impact with an effective dig once planning and design component.

⁴⁹ <https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf>.

⁵⁰ <http://ilsr.org/wp-content/uploads/2014/03/santa-monica-city-net-fiber-2014-2.pdf>.

⁵¹ https://mn.gov/deed/assets/pfa-annual-report_tcm1045-290187.pdf.

⁵² Relevant issues that might be addressed can be found in a sample model “dig once” local ordinance and a listing of examples of dig once policies included in Appendix E to the Task Force 2016 Annual Report (https://mn.gov/deed/assets/2016-bbtf-report_tcm1045-268826.pdf).

⁵³ https://mn.gov/deed/assets/pfa-annual-report_tcm1045-290187.pdf.

Potential Successor to the Governor’s Task Force on Broadband

The work of this Task Force and other task forces on broadband have helped propel discussion and action on broadband at the State Capitol. These task forces, representing a variety of interests, have the time and resources (with assistance from the Office of Broadband Development) necessary to study issues relevant to broadband policy and the expertise necessary to make informed policy recommendations to the Governor and Legislature.

A governor’s task force on broadband serves not only as resource to a governor on broadband policy, but shows an administration’s commitment to the issue of expanding broadband access throughout the state. Without a task force on broadband, and the elevated attention to broadband policy associated with it, Minnesota would likely not have aggressive broadband speed goals. It is for these reasons that we recommend a Minnesota Broadband Task Force as a resource to the Governor and the Legislature on broadband policy with a broad representation of perspectives and experiences, including provider, community, business and labor interests.

Recommendations

1. Provide direct funding to the Department of Employment and Economic Development for broadband mapping.
2. Take action to promote and communicate dig once policies, including development and dissemination of best practices and model policies to state agencies and other stakeholders. Ensure that agencies with construction oversight, construction funding, and land stewardship responsibilities ensure that they lead by example in implementing “Dig Once” policies which encourage broadband competition and deployment, including planning, joint use, construction and notification.
3. Fully fund the Telecommunications Equity Aid (TEA) and Regional Library Telecommunications Aid (RLTA) to facilitate broadband in K-12 education and libraries.
4. Continue a Minnesota Broadband Task Force as a resource to the Governor and the Legislature on broadband policy with a broad representation of perspectives and experiences, including provider, community, business and labor interests.

Conclusion

We know that a new governor and a new composition of the Legislature might change the dynamics of broadband policy in Minnesota. However, we hope that the objective of expanding broadband access throughout Minnesota and meeting our state speed goals remain a bi-partisan issues. We also hope that this report provides policymakers with at least some of the information—and policy recommendations—needed to make informed decisions.

Minnesota has made considerable progress toward meeting its statutory broadband speed goals, and providing ubiquitous broadband service throughout the state. This report highlights the work of the Task Force and its contributions to the development of broadband policy in Minnesota. Of course, any

progress on this bipartisan issue is due to the Governor working together with the Legislature, in a bipartisan manner, to help bring broadband service to those areas of the state that need it most.

The Office of Broadband Development carries out the implementation of broadband policy, and is charged with a number of responsibilities, including administering the Border-to-Border Broadband Development Grant Program and mapping of broadband availability. The Office of Broadband Development's implementation of broadband policy and its partnership with the Minnesota Department of Commerce are critical components of the "Minnesota Model".

The report also looks ahead to issues on the horizon that policymakers should consider when developing state broadband policy, from changes in federal broadband policy to potential future developments in technology to continued and novel approaches to state-level policy.

Summary of Recommendations

1. Fund the Office of Broadband Development through the base budget at levels sufficient for it to meet its statutory mandates and create an OBD operating fund to advance and promote programs and projects to improve broadband adoption and use, and maintain the existing partnership with the Minnesota Department of Commerce.
2. Provide on-going biennial funding of the Border-to-Border Broadband Development Grant Program at \$69.7 million per biennia until the state achieves its broadband speed goals.
3. Provide direct funding to the Department of Employment and Economic Development for broadband mapping.
4. Establish a legislative cybersecurity commission to enable information-sharing between policy-makers, state agencies, and private industry related to Minnesota's cybersecurity infrastructure, cybersecurity workforce issues and emerging technology, whose scope of work includes: (a) developing legislation to support and strengthen Minnesota's cybersecurity infrastructure, and (b) providing input or recommendations related to developing a multi-year strategic plan to secure Minnesota's IT environments.
5. Continue to understand the advances in technology that will drive both the demand for better broadband access and that will enable the delivery of broadband access to its citizens.
6. Take action to promote and communicate dig once policies, including development and dissemination of best practices and model policies to state agencies and other stakeholders. Ensure that agencies with construction oversight, construction funding, and land stewardship responsibilities ensure that they lead by example in implementing "Dig Once" policies which encourage broadband competition and deployment, including planning, joint use, construction and notification.
7. Fully fund the Telecommunications Equity Aid (TEA) and Regional Library Telecommunications Aid (RLTA) to facilitate broadband in K-12 education and libraries.

8. Continue a Minnesota Broadband Task Force as a resource to the Governor and the Legislature on broadband policy with a broad representation of perspectives and experiences, including provider, community, business and labor interests.



Minnesota Rural Broadband Coalition

Margaret Anderson Kelliher
Chair, Governor's Broadband Task Force
Minnesota Department of Employment and Economic Development
332 Minnesota Street, Suite E200
Saint Paul, MN 55101

June 4, 2018

Dear Chair Anderson Kelliher,

On behalf of our more than 70 coalition members, the Minnesota Rural Broadband Coalition wishes to thank the Governor's Broadband Task Force for its support of broadband access across the state. Our coalition represents a broad cross-sector of statewide and community interests: education, agriculture, main street businesses, manufacturing, health care, and more. We strongly urge the task force to consider the following priorities as you develop and adopt recommendations for legislative and executive branches and help policy leaders understand the central role that robust broadband plays in rural communities.

1. Continuation of the Task Force Review of Membership and Purpose: We believe that the Governor's Broadband Task Force is crucial to the success of the Border-to-Border Broadband Fund. It provides an opportunity for community members, advocates, providers, consumers, and others to have input and make recommendations on broadband policy in Minnesota.

The Coalition also believes that the Task Force should conduct a membership and representation review. We believe that, in its current form, broadband service providers have outsized representation compared to consumers, business owners, agriculture, and other important groups that are dedicated supporters of broadband funding.

2. Fund the Border-to-Border Broadband Fund: The grant program is essential to reaching the state broadband goals and allowing providers to extend and improve networks in the hardest to reach places in Minnesota. This program went unfunded for fiscal year 2019, and there remain significant portions of Minnesota, especially low-density rural areas, that continue to lack broadband service. The amount requested by all applicants continues far exceed the money available in the fund, showing the providers' continued interest in participating in this program by providers and community applicants.

3. Provide Multi-Year Funding for the Grant Program: Applicants have expressed concern with the single-year funding model currently used by the Legislature. The time allowed to complete the complex task of blending engineering, finance, partnership agreements, and community support into a competitive application is not conducive for larger, long-term projects. Stable, biennial funding—incorporated into DEED’s base funding—would give confidence to providers and communities alike to continue to plan and build partnerships and prepare effective project proposals. The Coalition believes that funding the Grant Program as part of the base budget in FY 2020/21 is of highest priority.

4. Continue to Support the Office of Broadband Development: Development (OBD) is a symbol that improving broadband networks and services across the state is a shared, non-partisan priority for Minnesotans. The OBD provides a critical link between communities and providers, documenting successful infrastructure project design and management. We believe the Task Force should emphasize the office should be maintained in the future and enhanced to include a role in promoting the adoption and use of broadband, including broadband based economic development strategies, so that the highest possible value is gained from broadband infrastructure investments. As we move towards the 2019 budget session, funding for the OBD remains a priority for the coalition.

5. Commitment to State Speed Goals Using Scalable Technology: The Task Force should consider barriers and opportunities to meet the state 2026 speed goals of 100mbps download and 20mbps upload as well as meeting unserved and underserved areas of the state. We continue to support the current requirement that funded projects must meet the scalability requirements and work towards the 2026 state speed goal. Without scalable technology, the rural broadband problem is merely being kicked down the road, doing a disservice to the State’s investment and communities seeking meaningful digital inclusion. We recommend the task force emphasize that state investment in broadband should continue to fund future-resilient technology infrastructure that meets the current scalability standards and will provide benefits well beyond 2016.

6. Review Mapping: The Task Force should review the OBD’s mapping to assure alignment of advancement in technology, such as wireless, is accounted for in mapping of unserved and underserved. This review should ensure adequate measurement of meeting state speed goals and not allowing areas to slip through the cracks.

7. Modify the Challenge Process: The challenge process remains an obstacle to delivering the best network possible to communities. The Challenge Process is overprotective of incumbent providers and discourages non-incumbent providers from participating in the program over concerns their efforts will be undermined. The process does not require the incumbent to install the same or better service as proposed by the applicant, rather it allows a challenger to improve service – not to 2026 speed goals – but just enough to prevent a grant, to the detriment of the community. If a provider is not meeting a community’s needs, they should not be allowed to place undue burdens on access to state grants.

8. Remove or Increase the \$5 million cap on projects: The \$5 million grant cap per project may limit applications for project that propose to cover larger areas, including entire counties. Larger projects may allow for more cost-efficient network planning and construction.

9. Evaluate New Broadband Solutions: We encourage the Task Force to review and highlight opportunities for creative solutions to meeting the state's broadband goals, including analysis of when such solutions are likely to be deployable. This may include marketing strategies, identifying barriers to creative solutions and recommending solutions.

Thank you for your work on behalf of the citizens of Minnesota and for your consideration of our priorities and recommendations.

Sincerely,



Nancy Hoffman
Chair, Minnesota Rural Broadband Coalition

Minnesota Rural Broadband Coalition

-Arrowhead Regional Development Commission	-Kanabec County EDA	-Nemadji Research Corporation
-Association of Minnesota Counties	-Kandiyohi County Economic Development	-Nobles County Economic Opportunity Network
-Cloquet Valley Internet Initiative	-League of Minnesota Cities	-North Region Health Alliance
-Chisago County HRA/EDA	-Mid-Minnesota Development Commission	-North Star Township
-Citizens Utility Board of Minnesota	-Mille Lacs Energy Cooperative	-Northland Foundation
-City of Winthrop	-Leech Lake Tribal Telecommunications	-Northwest Minnesota Foundation
-Cloquet Valley Internet Initiative	-Lincoln County EDC	-NW Regional Development Commission
-Coalition of Greater Minnesota Cities	-Meeker County EDA	-PCs for People
-Community of Minnesota Resorts	-MN Association of Community Telecommunications and Administrators	-Project FINE
-Community Technology Advisors Corp	-Minnesota Association of Professional County Economic Developers	-Range Association of Municipalities and Schools
-CTC	-Minnesota Association of Small Cities	-Redwing Ignite
-Cooperative Network	-Minnesota Association of Professional County Economic Developers	-Region 5 Regional Development Commission
-Cooperative Network Services	-Minnesota Association of Townships	-Region Nine Development Commission
-Development Services, Inc	-Minnesota Farmers Union	-Sherburne County EDA
-East Central MN Educational Cable Cooperative	-Minnesota Library Association	-Schools for Equity in Education
-East Central Regional Development Commission	-Minnesota Municipal Utilities Association	-Southern Minnesota Beet Sugar Cooperative
-Economic Development Association of Minnesota	-Minnesota Public Broadband Alliance	-Southern Minnesota Initiative Foundation
-EssentiHealth	-Minnesota Rural Education Association	-Southwest Initiative Foundation
-Finley Engineering	-Minnesota Rural Electric Association	-Southwest Regional Development Commission
-Fond du Lac Tribal Communications	-Minnesota Soybean Growers Association	-Turtle Island Communications
-GPS 45:93	-MN River Valley Education District	-Treacy Information Services
-Great River Energy	-MN Rural Counties Caucus	-Upper Minnesota Valley Regional Development Commission
-Greater Minnesota Partnership	-MVTW Wireless	-West Central Initiative
-Growth and Justice	-National Joint Purchasing Alliance	
-Headwaters Regional Development Commission		
-Hiawatha Broadband Communications		
-IMPACT 20/20		
-Institute for Local Self-Reliance		
-Iron Range Economic Alliance		
-ISD 317 Deer River		

Date: Thursday, March 29, 2018

To the Governor's Task Force on Broadband:

Currently my husband Chad and I live in rural Renville county with our four sons that are ranging from first grade through seventh grade. Over the last few years with the increase of technology in schools we have seen the struggle at home increase with our broadband issues. Our home is located in a rural area that we are currently only able to receive satellite dish internet. Currently we pay \$90 a month for extremely poor service, and if it is windy or rainy we really don't have internet at all. This means if our children have assignments or my husband or myself have work that requires internet use, we are at a loss. We will sometimes turn to our Verizon "hotspots" but again in our area that is not a great solution either, with typically very slow results.

We have reached out to several companies within our area trying to resolve this issue. Time and time again each company returns the calls saying, "Sorry we are not able to help you at this time, we will keep you on a list for the future." We can honestly say that we have been trying this route for the last few years, with the same responses.

Companies that we have reached out to include: MVTW Wireless, Mn Valley Communications, Arvig, Frontier, RS Fiber, Keltgen Technologies, Sheehan's and maybe one or two more. Even with the future updates of fiber coming to Renville County, what we can tell is we will miss that by a few miles to the west of us. We also recently learned that MN Valley Communications installed fiber to their customers which ends just a few miles south of us. Again, we continue to reach out to these organizations hoping that they install a new tower or fiber that could benefit us.

We want the Governor's Task Force on Broadband to realize there is still a huge issue with rural broadband and that satellite internet is not the solution. It is not fair that simply because we choose to live in rural Minnesota that we should be charged \$90 a month for satellite internet that doesn't work due to weather elements. When calling the company, we are always told we can upgrade but that would be an extreme price increase per month and they also want us to upgrade the dish and lock into a contract for so many years. I cannot count how many times our children have tears as they cannot finish their homework in a timely manner if even at all. From time to time we have written notes to our teachers having to explain why the homework is not done.

Thank you for taking time to read our letter and continue to work towards a solution for all of Minnesota!

Sincerely,



Chad & Jackie Edwards
74421 County Road 3
Hector MN 55342
cjedwards08@gmail.com

Appendix B: Cybersecurity Tips: “Stop. Think. Connect.”



STOP | THINK | CONNECT™

BASIC TIPS AND ADVICE

KEEP A CLEAN MACHINE

- **KEEP SECURITY SOFTWARE CURRENT:** Having the latest security software, web browser and operating system is the best defense against viruses, malware and other online threats.
- **AUTOMATE SOFTWARE UPDATES:** Many software programs will automatically connect and update to defend against known risks. Turn on automatic updates if that's an available option.
- **PROTECT ALL DEVICES THAT CONNECT TO THE INTERNET:** Along with computers, smartphones, gaming systems and other web-enabled devices also need protection from viruses and malware.
- **PLUG & SCAN:** USBs and other external devices can be infected by viruses and malware. Use your security software to scan them.

PROTECT YOUR PERSONAL INFORMATION

- **LOCK DOWN YOUR LOGIN:** Fortify your online accounts by enabling the strongest authentication tools available, such as biometrics, security keys or a unique one-time code through an app on your mobile device. Your usernames and passwords are not enough to protect key accounts like email, banking and social media.
- **MAKE YOUR PASSWORD A SENTENCE:** A strong password is a sentence that is at least 12 characters long. Focus on positive sentences or phrases that you like to think about and are easy to remember (for example, “I love country music.”). On many sites, you can even use spaces!
- **UNIQUE ACCOUNT, UNIQUE PASSWORD:** Separate passwords for every account helps to thwart cybercriminals.
- **WRITE IT DOWN AND KEEP IT SAFE:** Having separate passwords for every account helps to thwart cybercriminals. At a minimum, separate your work and personal accounts and make sure that your critical accounts have the strongest passwords.

CONNECT WITH CARE

- **WHEN IN DOUBT THROW IT OUT:** Links in emails, social media posts and online advertising are often how cybercriminals try to steal your personal information. Even if you know the source, if something looks suspicious, delete it.
- **GET SAVVY ABOUT WI-FI HOTSPOTS:** Limit the type of business you conduct and adjust the security settings on your device to limit who can access your machine.
- **PROTECT YOUR \$\$:** When banking and shopping, check to be sure the site is security enabled. Look for web addresses with “https://” or “shttp://,” which means the site takes extra measures to help secure your information. “Http://” is not secure.

STOPTHINKCONNECT.ORG



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BE WEB WISE

- **STAY CURRENT:** Keep pace with new ways to stay safe online: Check trusted websites for the latest information, and share with friends, family, and colleagues and encourage them to be web wise.
- **THINK BEFORE YOU ACT:** Be wary of communications that implore you to act immediately, offer something that sounds too good to be true or ask for personal information.
- **BACK IT UP:** Protect your valuable work, music, photos and other digital information by making an electronic copy and storing it safely.

BE A GOOD ONLINE CITIZEN

- **SAFER FOR ME, MORE SECURE FOR ALL:** What you do online has the potential to affect everyone – at home, at work and around the world. Practicing good online habits benefits the global digital community.
- **POST ONLINE ABOUT OTHERS AS YOU HAVE THEM POST ABOUT YOU:** The Golden Rule applies online as well.
- **HELP THE AUTHORITIES FIGHT CYBERCRIME:** Report stolen finances or identities and other cybercrime to the Internet Crime Complaint Center (www.ic3.gov) and to your local law enforcement or state attorney general as appropriate.

OWN YOUR ONLINE PRESENCE

- **PERSONAL INFORMATION IS LIKE MONEY. VALUE IT. PROTECT IT:** Information about you, such as your purchase history or location, has value – just like money. Be thoughtful about who gets that information and how it's collected through apps and websites.
- **BE AWARE OF WHAT'S BEING SHARED:** Set the privacy and security settings on web services and devices to your comfort level for information sharing. It's OK to limit how and with whom you share information.
- **SHARE WITH CARE:** Think before posting about yourself and others online. Consider what a post reveals, who might see it and how it could be perceived now and in the future.

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Appendix C: Legal Opinions and Documents Related to Bonding for Fiber

DORSEY & WHITNEY

A PARTNERSHIP INCLUDING PROFESSIONAL CORPORATION

350 PARK AVENUE
NEW YORK, NEW YORK 10022
(212) 455-2800

1300 CONNECTICUT AVENUE, N. W.
WASHINGTON, D. C. 20004
(202) 657-0700

9 BRACKENRICH STREET
LONDON EC3V 9AT, ENGLAND
44-71-999-9334

36, RUE TRONCHET
75009 PARIS, FRANCE
33-1-42-56-50-49

35 SQUARE DE MEES
B-1040 BRUSSELS, BELGIUM
32-2-504-46-11

220 SOUTH SIXTH STREET
MINNEAPOLIS, MINNESOTA 55402-1498
(612) 340-2600

TELEX 29-0805
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THOMAS S. HAY
(612) 343-7965

301 FIRST AVENUE, S. W., SUITE 200
ROCHESTER, MINNESOTA 55902
(507) 268-3156

1200 FIRST INTERSTATE CENTER
BELLINGHAM, MONTANA 59103
(406) 252-0500

507 DAVIDSON BUILDING
GREAT FALLS, MONTANA 59401
(406) 737-3632

127 EAST FRONT STREET
MERCER, MONTANA 59002
(406) 751-6005

301 GRAND, SUITE 2000
DES MOINES, IOWA 50309
(515) 263-1000

January 5, 1994

Mr. Peter Sausen
Assistant Commissioner of Finance
Minnesota Department of Finance
658 Cedar Street, 4th Floor
St Paul, Minnesota 55155

Re: General Obligation Bond Financing of Certain
Fiber Optic Cable Installations

Dear Mr. Sausen:

You have asked whether we could issue an unqualified legal opinion approving the issuance of state general obligation bonds to finance the purchase and installation of fiber optic cable. The cable would connect (1) major state-owned facilities (e.g. the capitol complex and the state university system campuses with each other; and (2) state buildings within a complex (e.g. state university system campus buildings). The cable would be located on state-owned property, or in state, county or city owned rights-of-way or easements. After reviewing the constitution, various earlier memoranda interpreting it, and other relevant information, we have concluded that, except as noted below with respect to the acquisition of land and permanent easements, we could not issue an unqualified opinion approving the issuance of state general obligation bonds for this purpose without a test case.

The Minnesota Constitution, Article XI, governs the issuance of general obligations bonds by the State. Article XI, Section 5, provides in part that State bonds may be issued:

"to acquire and to better public land and buildings and other public improvements of a capital nature and to provide money to be appropriated or loaned to any agency or political subdivision of the state for such purposes if the law authorizing the debt is

DORSEY & WHITNEY

Mr. Peter Sausen
Assistant Commissioner of Finance
January 6, 1994
Page 2

adopted by the vote of at least three-fifths
of the members of each house of the
legislature." [Emphasis added.]

As we understand it, the projects involve the acquisition of some land and permanent easements for location of the cable and to this extent could be bond financed. However, the purchase of the cable and the installation of it do not comprise the acquisition of land and buildings or clearly comprise (1) the betterment of "land" or (2) the acquisition and betterment of "other public improvements." As it has been explained to me, the cable would merely be buried in the land, typically inside existing conduits or a plastic conduit tube. The cable could be easily removed without damage to the land in which it is buried, and as easily, although not as desirably, be installed above ground on telephone poles for example. It would not enhance the usefulness of the land in which it was buried or become an integral part of it and would likely not constitute a "fixture." Thus it doesn't seem to "better public land."

With respect to the meaning of the phrase "other public improvements" we have previously concluded that it most likely refers to additions to real estate, not personal property. In view of the facts cited above we think the fiber optic cable when installed will not lose its character as personal property and thus will not constitute an "improvement" under Article XI.

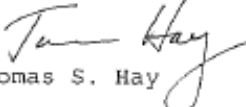
In order to approve the issuance of bonds under Article XI we, as bond counsel, must determine that there is no reasonable doubt as to the authority for their issuance. In view of the facts set forth above, we think there is reasonable doubt as to whether the project would "better public land" or constitute an "improvement" within the meaning of Article XI. Thus, we could not issue the opinion in question.

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Mr. Peter Sausen
Assistant Commissioner of Finance
January 6, 1994
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I hope this is satisfactory for your purposes at this time; however, if additional comment or explanation is needed, please let me know.

Very truly yours,


Thomas S. Hay

TSH/vm

cc: C. Eller

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ROCHESTER
SALT LAKE CITY
VANCOUVER

July 5, 2000

Mr. Peter Sausen
Minnesota Department of Finance
400 Centennial Office Building
658 Cedar Street
St. Paul, MN 55155



Re: Permitted Uses of State General Obligation Bonds;
Department of Administration Technology Projects

Dear Mr. Sausen:

The Department of Finance has received an inquiry from the Department of Administration regarding the possible use of state general obligation bonds to fund a series of technology projects (working description, **Attachment 1**). You have asked us to consider the legality thereof.

State general obligation bonds constitute "public debt" within the meaning of Article XI, Section 4 of the Constitution, and therefore are subject to the limitations of Article XI, Section 5 and Section 7. We have previously provided guidance concerning the interpretation of these constitutional provisions in a letter to you dated April 24, 1989, a memorandum entitled "Expenditures Eligible for State General Obligation Bond Financing," and a letter to you dated March 15, 1990 and accompanying memorandum entitled "What Expenditures Qualify as Capital Expenditures Financeable From State Bond Proceeds." The principles discussed therein are relevant to technology acquisition and we have briefly summarized them, as well as additional considerations applicable to general obligation bond financing for technology, in **Attachment 2** hereto, a memorandum entitled "Summary of Constitutional Principles Applicable to State General Obligation Bond Financing for Technology."

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Mr. Peter Sausen
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In applying the constitutional requirements to the proposed technology programs, we note that bond counsel is held to a high opinion standard. In order to render an approving opinion, we must be able to conclude that it would be unreasonable for a court to hold to the contrary. While the opinion standard is stringent, it serves to assure the investing public that the general obligation bonds of the State of Minnesota are of the highest quality and that there is no reasonable likelihood that such bonds suffer any legal infirmity.

Proposed Technology Projects
Department of Administration

At the outset, we assume that the Department of Administration technology projects meet the "public purpose" test because the projects achieve legitimate public benefits and because title to technology improvements is to remain with the State. We further believe that many of the infrastructure enhancements generally described in these technology proposals may be financed with the proceeds of general obligation bonds if such infrastructure changes constitute capital betterments of public buildings within the meaning of the constitutional language. While individual projects and bonding bill language would need to be analyzed for compliance with constitutional principles, the following guidance, which is keyed to the various elements of the proposal, should be kept in mind:

A. Network Infrastructure

1. State offices are located either in state-owned buildings or in leased facilities; facilities leases tend to be short term (i.e., less than five years, but some are as long as ten years).

The type of State office is relevant to meeting the "public building" test; State-owned buildings obviously comply, but short-term leases are problematic. In the absence of a clarification of the law, we would be unable to render an approving opinion on bonds used to finance betterments of leaseholds of less than ten years; the ten-year standard (which has been used by the State in the past) helps to ensure, in conjunction with other factors, that the "public" interest is substantial. We have previously concluded that "to acquire" means acquisition by purchase; thus, the ten-year test does not authorize general obligation bonding for build-outs made upon initial leasing of space.

2. Such offices have need for infrastructure changes to accommodate technology; such changes will vary from site to site, but may include:

DORSEY & WHITNEY LLP

Mr. Peter Sausen
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- a) installation of coaxial cable ("cable") and/or fiber-optic wire ("fiber") for internal transmission; cable or fiber may be run through walls, under floors, above drop ceilings and the permanence of installation will vary; may include installation in ground and connector devices (jacks, hubs, terminals) - cable and fiber installation typically is building-wide and remains beyond ten years, most often for the life of the building;

Installation of coaxial cable and/or fiber-optic wire may constitute a betterment and not mere maintenance if accomplished as part of a program of substantial technological upgrade to a building. A betterment must renovate, improve or expand, i.e., change the character or function, not merely repair or replace; typically cannot be removed without difficulty or damage to the building; must result in an increase in value and/or useful life; and must not be recurring or predictable. In-ground installation and connector devices may be included in appropriate cases as long as they are located on the public building site.

- b) changes to utility systems, i.e., electrical, cooling, ventilation, etc., necessary to support technology; may include fire suppression, wall and structural alterations and is often permanent;

Changes to utility systems necessary to support technology comprising betterments as defined in 2(a) may be financed in appropriate circumstances; mere maintenance is neither a betterment nor capital and would not be eligible for debt financing.

- c) creation of technology centers within office space to facilitate technological support; technology centers include computer or server rooms and related wiring closets within buildings; alteration to building with increased electrical service and/or conduit to separate cable or fiber from other utilities;

Technology centers, including computer or service rooms and related wiring closets may constitute part of a betterment program in appropriate circumstances; increased electrical service and/or conduits to cable or fiber from other utilities may also be financeable, as described in 2(a) and (b) above.

- d) creation of "clean" rooms to prevent contamination of systems when certain functions are performed; some "clean" rooms today, but more

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often secure server rooms with specialized design, floor plan, utilities, and added security modifications;

"Clean" rooms and/or secure service rooms, installed as part of a betterment program for a particular building, may be paid for with general obligation bond proceeds.

- e) acquisition of routers, switches, transmitters, repeaters or similar devices as part of technology infrastructure; these items have a relatively short useful life (i.e., less than five years), and are either replaced or upgraded; such devices may be installed on racks or bolted down but are able to be removed physically with little damage to the building (although removal in some cases would result in disruption of technology service and require significant rewiring, etc.) trays, racks, closet structures are long-lived (beyond ten years) and many devices within the server room and wiring closets last beyond five years;

Routers, switches, transmitters, trays, racks, closet structures and other similar devices may not be financed with general obligation bonds on an individual or repair/replacement basis; however, if these items are part of technology infrastructure (not, for example, items such as personal computers that do not comprise an integral part of the building's technology system), they may be acquired as a component part of a general program that comprises a capital betterment.

- f) technology infrastructure installed in leased office space will remain the property of the State.

As described above, the retention of legal title by the State is necessary to meet the "public" building test.

- 3. Data are transmitted to and from State offices either through cable and fiber or by wireless transmission.
 - a) cable/fiber systems require running of cable/fiber between office locations as well as supporting equipment; would be installed on land owned, leased or acquired through easements by the State or government units; includes cable and fiber to/from state office buildings and nearest service point of presence at street or pole;

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Cable/fiber systems that are a component part of the betterment of a particular building and its site may be financed with general obligation bonds, as described in 2(a) above. Cable/fiber that is located on public land that is not the site of a bettered building is not part of a building's betterment program. Such cable or fiber can be removed from its location relatively easily, might not even be incorporated into the land, and does not improve the value of the land; thus, mere stringing or burying of cable or fiber on public land does not constitute a betterment of such land and may not be financed with general obligation bonds.

- b) wireless systems require reception-transmission facilities at the office location, which equipment is attached to the building and in some cases may not be removable without damage to building; such systems for public safety utilize microwave networks and the physical characteristics of microwave equipment are generally similar to other wireless systems; wireless systems require the installation of tower facilities constituting substantial structures not easily or cheaply removed from their locations on property owned, leased or acquired through easement by the State or government units. This includes transmission within the wireless system.

Wireless system infrastructure located at state buildings may be financed if part of a betterment program; transmission facilities located at separate locations would need to be reviewed on a case-by-case basis. It may be possible that such towers will, in particular cases, constitute "improvements" as described in the Constitution.

B. Major Statewide Applications

1. Development of customized software logic and processes to implement various statewide system applications; costs are people-intensive (i.e., systems analysts, programmers etc.).
2. Systems include but are not limited to: criminal and juvenile justice systems; electronic filing systems; integrated web service delivery systems; optical scanners; geographic positioning systems; electronic voting systems; automated fingerprint ID systems; kiosks; electronic security systems; water/air/feedlot quality monitoring systems; environmental data sharing systems.

Many of these systems have costs measured in tens of millions of dollars and expected lives of twenty or more years. Intellectual property (licenses and code) is purchased and

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Mr. Peter Sausen
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created. The largest share of expense is in the building phase and may be spent over two or more biennia.

C. Data Management

1. Generally similar to production management technology described in B above, but with recognition that data are an "asset" of the State and investments in data management tools will result in enhanced value and prolonged life of the data asset. Examples of enhanced value are transformation of data from production systems into data for complex analysis or historical preservation.
2. Expenses related to management, transformation, manipulation and transfer movement of data from environment to environment; costs are people-intensive, but will include acquisition of certain equipment as described in A(2)(e) above. Expenses will also include development of metadata dictionaries and repositories and data warehouses.

The development and acquisition of the systems described in B. and C. above, while expensive and undeniably important, do not constitute the acquisition or betterment of land or buildings. The word "improvements" as commonly used in the legal sense means enhancements to real property, not equipment or software. Moreover, certain of the costs associated with the described programs may not be "capital" expenses. Even assuming that financing is sought only for capital items, a court might reasonably conclude that the word "improvements" should be interpreted in historical fashion. Thus, under current law the bond counsel opinion standard would prevent us from approving the use of general obligation bonds for these purposes. To the extent that these systems include either equipment or software embedded in mainframes acquired and installed during a betterment program, such applications could potentially be financed with bond proceeds.

Bonding Bill Language

We reiterate the constitutional requirement contained in Article XI, Section 7 that any bonding bill "distinctly specify" the purposes for the issuance of bonds and the amount of bonds authorized for each purpose. Because most of the technology proposals are just in the planning stage, it may be particularly difficult to meet the constitutional requirements without the statutory creation of a State program authorizing the related capital projects. If such a program were created, then the bonding bill could cross-reference that statute for purposes of meeting the requirements of Article XI, Section 7.

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Lease-Purchase Alternative

While the language of the Constitution does not authorize the issuance of general obligation bonds for all elements of the technology programs (the Constitution authorizes the issuance of long-term debt only for capital building projects because historically such projects were the only long-term assets acquired by the State), the use of lease-purchase financing may be available to State officials considering how to pay for technology programs. This relatively new method of acquiring short-term financing for equipment needs is already used by the Department of Finance to fund equipment acquisitions for which general obligation bond debt is inappropriate. Such contracts do not constitute "public debt" and are outside the limitations of Article XI, Section 5 and Section 7. Often lease-purchase financing may be undertaken on a tax-exempt basis similar to general obligation bonds.

Other States

We have been advised that there are at least five states (Connecticut, Massachusetts, Montana, Tennessee and Vermont) that have issued debt for technology purposes. Three of these states (Connecticut, Tennessee and Vermont) have no constitutional limitations on the issuance of debt. In each of these jurisdictions, then, the legislature is free to authorize the issuance of bonds for any legitimate public purpose. The remaining two states (Massachusetts and Montana) have very limited constitutional restrictions on the issuance of debt, none of which is applicable to technology. Thus, these states do not provide useful precedent.

We hope that this analysis is helpful in determining which technology projects are appropriate for general obligation bond financing. The problem is obviously complex and we look forward to working with you and others in determining how the State should proceed.

Very truly yours,


Leonard S. Rice

LSR/pmh

Enclosures

cc: Christie Eller, Esq.

Attachment 1

Proposed Technology Projects Department of Administration

A. Network Infrastructure

1. State offices are located either in state-owned buildings or in leased facilities; facilities leases tend to be short term (i.e., less than five years, but some are as long as ten years).
2. Such offices have need for infrastructure changes to accommodate technology; such changes will vary from site to site, but may include:
 - a) installation of coaxial cable ("cable") and/or fiber-optic wire ("fiber") for internal transmission; cable or fiber may be run through walls, under floors, above drop ceilings and the permanence of installation will vary; may include installation in ground and connector devices (jacks, hubs, terminals) - cable and fiber installation typically is building-wide and remains beyond ten years, most often for the life of the building;
 - b) changes to utility systems, i.e., electrical, cooling, ventilation, etc., necessary to support technology; may include fire suppression, wall and structural alterations and is often permanent;
 - c) creation of technology centers within office space to facilitate technological support; technology centers include computer or server rooms and related wiring closets within buildings; alteration to building with increased electrical service and/or conduit to separate cable or fiber from other utilities;
 - d) creation of "clean" rooms to prevent contamination of systems when certain functions are performed; some "clean" rooms today, but more often secure server rooms with specialized design, floor plan, utilities, and added security modifications;
 - e) acquisition of routers, switches, transmitters, repeaters or similar devices as part of technology infrastructure; these items have a relatively short useful life (i.e., less than five years), and are either replaced or upgraded; such devices may be installed on racks or bolted down but are able to be removed physically with little damage to the building (although removal in some cases would result in disruption of

technology service and require significant rewiring, etc.) trays, racks, closet structures are long-lived (beyond ten years) and many devices within the server room and wiring closets last beyond five years;

- f) technology infrastructure installed in leased office space will remain the property of the State.

- 3. Data are transmitted to and from State offices either through cable and fiber or by wireless transmission.

- a) cable/fiber systems require running of cable/fiber between office locations as well as supporting equipment; would be installed on land owned, leased or acquired through easements by the State or government units; includes cable and fiber to/from state office buildings and nearest service point of presence at street or pole;
- b) wireless systems require reception-transmission facilities at the office location, which equipment is attached to the building and in some cases may not be removable without damage to building; such systems for public safety utilize microwave networks and the physical characteristics of microwave equipment are generally similar to other wireless systems; wireless systems require the installation of tower facilities constituting substantial structures not easily or cheaply removed from their locations on property owned, leased or acquired through easement by the State or government units. This includes transmission within the wireless system.

B. Major Statewide Applications

- 1. Development of customized software logic and processes to implement various statewide system applications; costs are people-intensive (i.e., systems analysts, programmers etc.).
- 2. Systems include but are not limited to: criminal and juvenile justice systems; electronic filing systems; integrated web service delivery systems; optical scanners; geographic positioning systems; electronic voting systems; automated fingerprint ID systems; kiosks; electronic security systems; water/air/feedlot quality monitoring systems; environmental data sharing systems.

Many of these systems have costs measured in tens of millions of dollars and expected lives of twenty or more years. Intellectual property (licenses and code) is purchased

and created. The largest share of expense is in the building phase and may be spent over two or more biennia.

C. Data Management

1. Generally similar to production management technology described in B above, but with recognition that data are an "asset" of the State and investments in data management tools will result in enhanced value and prolonged life of the data asset. Examples of enhanced value are transformation of data from production systems into data for complex analysis or historical preservation.
2. Expenses related to management, transformation, manipulation and transfer movement of data from environment to environment; costs are people-intensive, but will include acquisition of certain equipment as described in A(2)(e) above. Expenses will also include development of metadata dictionaries and repositories and data warehouses.

Attachment 2

SUMMARY OF CONSTITUTIONAL PRINCIPLES APPLICABLE TO STATE GENERAL OBLIGATION BOND FINANCING FOR TECHNOLOGY July 5, 2000

State general obligation bonds constitute "public debt" within the meaning of Article XI, Section 4 of the Constitution, and therefore are subject to the limitations of Article XI, Section 5 and Article XI, Section 7. We have previously provided guidance concerning the interpretation of these constitutional provision in a letter to Peter Sausen dated April 24, 1989 (Exhibit A), a memorandum entitled "Expenditures Eligible for State General Obligation Bond Financing" (Exhibit B), and a letter to Peter Sausen dated March 15, 1990 and accompanying memorandum entitled "What Expenditures Qualify as Capital Expenditures Financeable From State Bond Proceeds" (Exhibit C). The principles discussed therein are relevant to technology acquisition and a brief summary of them, as well as additional considerations applicable to general obligation bond financing for technology, follow.

All expenditures of State money, including the proceeds of State general obligation bonds, must be for a public purpose. Additionally, the Constitution provides that:

Public debt may be contracted and works of internal improvements carried on for the following purposes:

(a) to acquire and to better public land and buildings and other public improvements of a capital nature and to provide money to be appropriated or loaned to any agency or political subdivision of the state for such purposes if the law authorizing the debt is adopted by the vote of at least three-fifths of the members of each house of the legislature;

Minnesota Constitution, Article XI, §5. Article XI, Section 7 further states that "... each law authorizing the issuance of bonds shall distinctly specify the purposes thereof and the maximum amount of the proceeds authorized to be expended for each purpose." Therefore, all expenditures of bond proceeds must be (1) for a public purpose, (2) to acquire and to better (3) public land and buildings (4) and other public improvements (5) of a capital nature, and (6) distinctly specified by law in purpose and amount.

Public Purpose

A public purpose exists where an expenditure can reasonably be expected to achieve a legitimate public goal or benefit, even though some benefit may result to non-public interests. A determination of public purpose depends upon the nature of the expenditure and the extent to which the public goal or benefit is accomplished, and the extent to which it is the dominant benefit to be derived

from the expenditure. Private benefit may result, but it should not be the dominant or overriding benefit of the expenditure. The nature of the expenditure as public is affected by whether, by both historical and contemporary standards, the expenditure is to be made with respect to a subject matter which is proper for government action; or instead is made with respect to a subject reserved for the private sector. The legislature is given great deference in its determination of public purpose.

To Acquire and To Better

"To acquire" is generally understood to mean acquisition by purchase. "To better" typically means to substantially renovate, to improve or to expand, to change the character or function, not merely to repair or to replace; betterments cannot be removed without substantial difficulty or damage to the original; and property that has been bettered typically will have an increase in value and/or useful life. Betterments are not recurring or predictable.

Public Land and Buildings

Article XI, Section 5 uses the word "public" to characterize the land, buildings and other improvements which may be financed with State bonds. "Public" is not defined, but we have previously concluded that the word refers to ownership of a substantial interest in the subject property, as well as its use for a public purpose. State bonds cannot be issued to fund a project to be owned by a person or entity other than the State, either directly or through its agencies and instrumentalities or a political subdivision of the State, or where the State's interest in the affected building or land is insubstantial, i.e., less than ten years in length.

Projects of the Minnesota Historical Society have been determined to be public and have been financed with State bonds. However, projects of the following entities or for the following purposes are not so clearly publicly owned that State general obligation bonds could be issued to finance them under present law: (a) Indian tribes, (b) Minnesota public radio, (c) Minnesota public television, (d) grants to private property owners to build or improve on-site sewage disposal systems, and (e) grants to private corporations to build or improve sewage treatment works which will serve the public. These projects probably involve a public purpose but must be financed with appropriations or local government unit bonds as part of a local government program of some sort.

Improvements

The word "improvement" is used in law to describe a permanent addition to real property (and not equipment or other personal property) that increases the value of the real property, involves the expenditure of time and money, and makes the real property more useful or valuable, as distinguished from mere replacement or repairs.

Expenditures of a Capital Nature

Projects financed with State bond proceeds are limited to expenditures for land, buildings and other public improvements of a "capital nature." Operating costs cannot be financed with State bonds. The definition of "capital expenditure" under generally accepted accounting principles applicable to governmental entities is as follows:

Capital Expenditures. Expenditures resulting in the acquisition of or addition to the government's fixed assets which are long-lived tangible assets obtained or controlled as a result of past transaction, events or circumstances. Fixed assets include buildings, equipment, improvements other than buildings, and land.

We have previously summarized the criteria to be used in determining whether an expenditure is a "capital expenditure" as follows:

- (a) an expenditure for acquisition or improvement of property must be made with respect to a "fixed asset" such as land, buildings, improvements to land other than buildings or equipment;
- (b) a fixed asset being acquired must be "long-lived"; an interest in land of ten years duration has been determined to qualify, and it is suggested that only other fixed assets with an actual useful life of at least ten years should qualify;
- (c) an expenditure to improve a fixed asset already owned must (i) comprise a substantial improvement or expansion of the fixed asset, (ii) extend the useful life or substantially increase the value of the fixed asset, and (iii) not be predictable or recurring; and
- (d) an expenditure must be project specific.

For example, expenditures for studies to determine the need for a project, for educational, information or lobbying for a project which has not been sited, and expenditures for computer models and financial information with respect to a project not yet sited are not properly categorized as capital expenditures.

Expenditures for equipment acquired independently of an acquisition or betterment project which has a useful life of less than ten years are not eligible capital expenditure. Expenditures for repairs and replacement of existing structures and equipment typically do not qualify as capital expenditures.

Distinct Specification of Purpose and Amount

Article XI, Section 7 requires that any law authorizing State general obligation bonds "distinctly specify" the purposes for which such bonds are issued and the maximum amount of proceeds authorized to be expended for such purpose. Thus, in the law authorizing general obligation bonds, either the specific project to be financed must be identified or there must be a specific reference to a statute establishing a specific governmental program which authorizes public projects of a capital nature to be financed. In the past bonding bills have not met this requirement because: (a) the description of the purpose for which the bonds are to be issued was so brief or vague as to be unintelligible, or (b) the description authorized expenditures for projects not identified or even presently identifiable, and did not "distinctly specify" the purpose by reference to a State program set forth in the statutes.

- Exhibit A Letter to Peter Sausen, April 24, 1989
- Exhibit B Memorandum - "Expenditures Eligible for State General Obligation Bond Financing"
- Exhibit C Letter to Peter Sausen, March 15, 1990 and Memorandum - "What Expenditures Qualify as Capital Expenditures Financeable from State Bond Proceeds"



LEONARD S. RICE
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FAX (612) 340-2843
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March 17, 2010

The Honorable Lori Swanson
Attorney General
102 State Capitol
St. Paul, MN 55155

Re: Proposed Fiber Optic Infrastructure Grant Program

Dear Attorney General Swanson:

You have requested that we review a proposed fiber optic infrastructure grant program (the "Program," copy attached) to determine if general obligation bonds of the State of Minnesota may be issued therefor.

General obligation bonds are "public debt" within the meaning of Article XI, Section 4 of the Constitution and consequently are subject to the limitations of Article XI, Section 5, which requires in part that public debt be issued:

"to acquire and to better public land and buildings and other public improvements of a capital nature and to provide money to be appropriated or loaned to any agency or political subdivision of the state for such purposes...."

It appears to us that the Program authorizes capital expenditures that include (i) the acquisition or betterment of public land, (ii) the betterment of public buildings, or (iii) the acquisition of public improvements. With respect to the public improvement analysis, the decision of the Minnesota Supreme Court in Lietz v. Northern States Power Company, 718 N.W.2d 865 (Minn. 2006) is helpful. While individual projects would need to be analyzed for compliance with applicable constitutional provisions, the Program's purposes generally comport with the constitutional requirements for the use of general obligation bond proceeds.

Article XI, Section 5 of the Constitution does not generally authorize the expenditure of bond proceeds for the acquisition of equipment, and the Program's definition of "fiber optic infrastructure" specifically excludes computers, telephones and cameras. To the extent individual projects include freestanding equipment that is not incorporated into the betterment of public land, buildings or improvements, such equipment should not be acquired with the proceeds of general obligation bonds.

Finally, we note that the Program's definition of "school district" includes charter schools. Charter schools are not state agencies or political subdivisions to which general obligation bond proceeds may be appropriated or loaned under Article XI, Section 5 of the Constitution.

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The Honorable Lori Swanson
March 17, 2010
Page 2

I hope this is responsive to your needs. Please contact me with any questions.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'L. S. Rice', written over the typed name.

Leonard S. Rice

LSR/pmh
Enclosure
cc: Kathy Kardell (w/encl)

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Appendix D: 2018 Meeting Details, Presentations and Other Correspondence

February 8—State Capitol, Room 316, St. Paul, MN

- [Meeting Agenda](#)
- [Meeting Minutes](#)
- [Comcast Presentation](#)
- [AT&T Presentation](#)
- [AT&T Plans 5G Boost for Super Bowl & Beyond](#)
- [AT&T Big Game Day](#)

April 3—Administration Building, Room 116B, St. Paul, MN

- [Meeting Agenda](#)
- [Meeting Minutes](#)
- [Minnesota High Tech Association FirstNet Presentation](#)
- [FirstNet Presentation](#)

May 10—Department of Employment and Economic Development, James J. Hill Conference Room, St. Paul, MN

- [Agenda](#)
- [Meeting Minutes](#)
- [Blockchain and Crypto Currencies](#)
- [Minnesota K-12 Connect Forward Initiative](#)
- [Securing Minnesota](#)

June 07—CNH Industrial, Benson, MN

- [Agenda](#)
- [Meeting Minutes](#)
- [MN Rural Broadband Coalition](#)
- [Broadband in the RDC](#)

July 10—State Capitol, Room 316, St. Paul, MN

- [Agenda](#)
- [Minnesota Rural Broadband Coalition](#)
- [Impact of CAF II-funded Networks](#)
- [Measuring Impact of Broadband on the Community](#)

September 6—Senate Office Building, Room 2308, St. Paul, MN

- [Agenda](#)