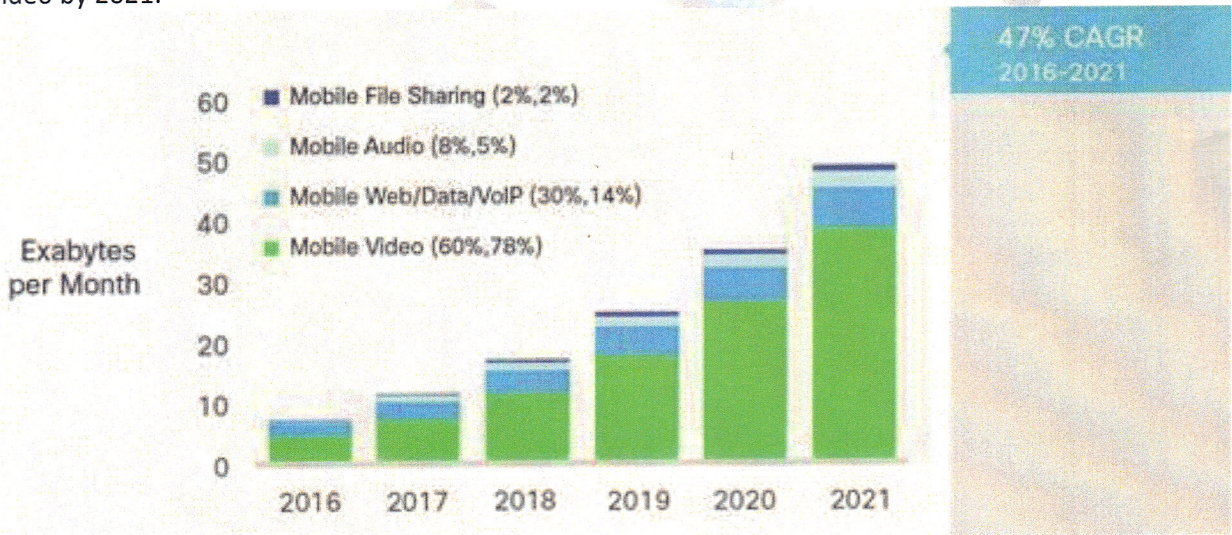




Mobile data usage¹⁵

Consumption of mobile data by younger generations continues to grow. The increase in usage of video chats, Snapchat and Netflix, is leading to the prediction of over 75 percent of all mobile traffic being video by 2021.



Types of mobile data used¹⁶

Connected devices are also seeing a significant growth surge. Gartner predicts that by the end of 2017, there are expected to be 8.4 billion devices connected to the Internet. By 2020, this number will be more than 20 billion.¹⁷ 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.

¹⁵ https://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.doc/jcr_content/renditions/mobile-white-paper-c11-520862_8.jpg.

¹⁶ https://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.doc/jcr_content/renditions/mobile-white-paper-c11-520862_24.jpg.

¹⁷ <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>.

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 during Super Bowl LII.

Rural and other lower-density population areas currently face challenges with existing 4G coverage. The smaller coverage areas of 5G will mean that it will likely be sometime before these areas can take advantage of its benefits.

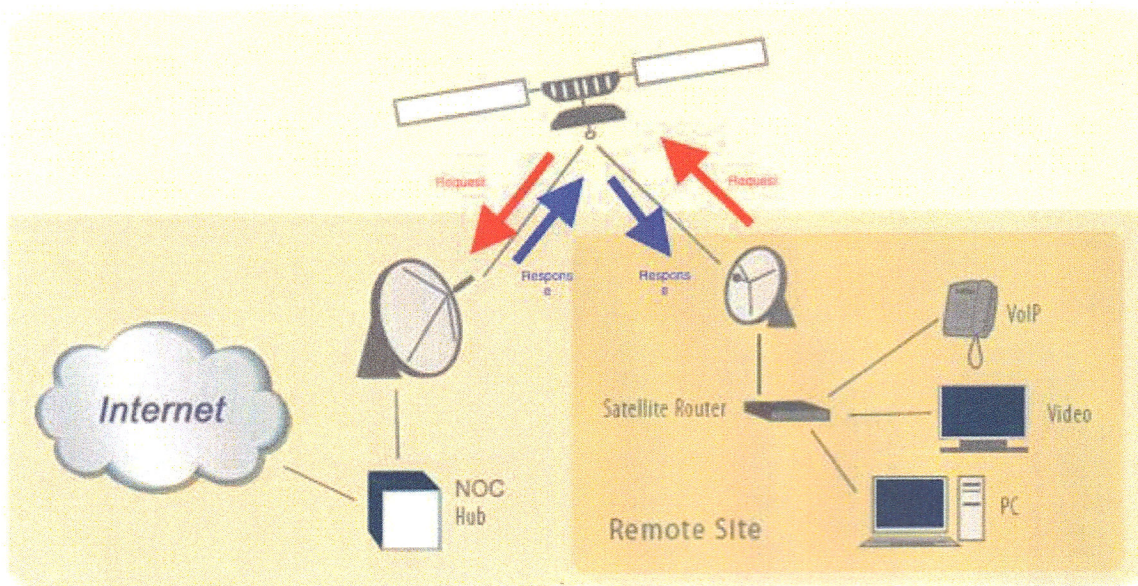
Fiber has a significant role to play in 5G as many of these small cells need to interconnect with fiber. The fiber provides high speed and capacity connections to the small cells, meaning that the 5G networks of tomorrow will be some of the "most wired" wireless networks ever deployed.

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.¹⁸

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

¹⁸ <http://www.theamericanconsumer.org/2018/07/morning-consult-5g-is-coming-and-states-need-to-be-ready/>



Satellite Internet¹⁹

The satellite acts as a connection pathway between the remote site (home or business) and the NOC (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 up which will allow most applications to function like they would on broadband from cable or DSL.

There are some challenges with satellite internet. All 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.

Another challenge can be the data caps imposed by the providers. Some traditional broadband and fixed wireless providers also impose data caps, but the caps imposed by the satellite providers are usually lower. Previously, these limits were hard caps that you could either not exceed or exceed with significant overage charges. Now, while there may be no cost to exceed the cap, the satellite providers will often reduce your speeds down to < 3 Mbps.²⁰

The size of the satellite caps range from 10-150 GBs. This may seem like an adequate amount of data, but iGR Research²¹ reported last year that the average monthly broadband usage per household is 190

¹⁹ http://www.groundcontrol.com/How_Does_Satellite_Internet_Work.htm.

²⁰ <https://www.hughesnet.com/taxonomy/term/831>

²¹ <http://www.telecompetitor.com/igr-average-monthly-broadband-usage-is-190-gigabytes-monthly-per-household/>.

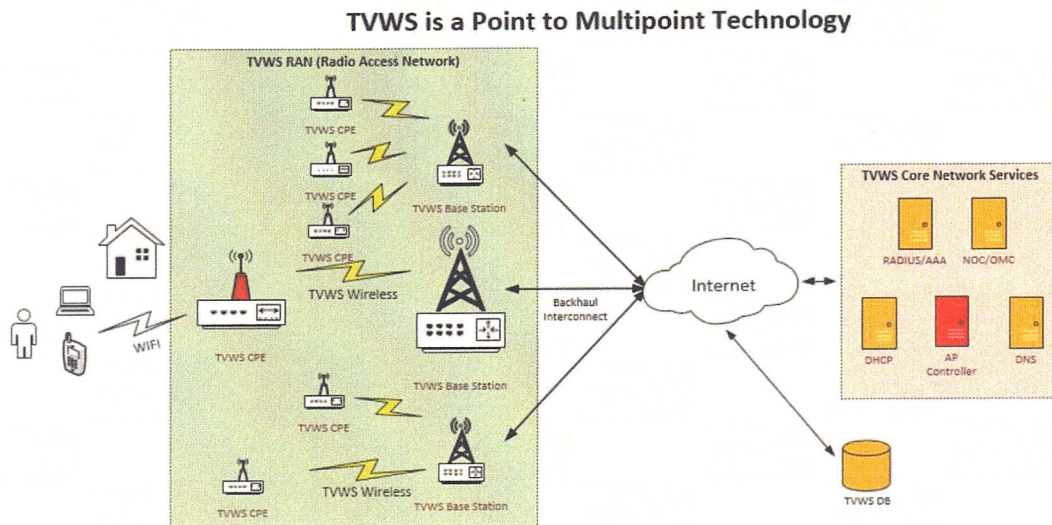
GBs while both AT&T²² and Comcast²³ claim that their average home Internet users consume at least 100 GBs of data per month. This shows that while today's satellite internet offerings can fill the coverage gap, they still may not meet the needs of the average household. And, as with fixed wireless service, the monthly rates for service tend to be significantly higher than for wired service. Satellite service also requires initial charges for equipment and a two year service contract.

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.



TV Whitespace Overview²⁴

²² <https://www.att.com/esupport/article.html#!/dsl-high-speed/KM1010099>.

²³ <https://www.xfinity.com/support/internet/data-usage-average-network-usage/>.

²⁴ Microsoft Presentation to September 2017 Broadband Task Force Meeting - https://mn.gov/deed/assets/microsoft-airband_tcm1045-313541.pdf.

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.

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 the air adds little to 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.

Summary of Alternative Broadband Options

	Overview	Strengths	Challenges
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 • High monthly rates compared to wireline at same speed
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 • 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 some 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 • Initial equipment costs and two year contracts
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 • Can more easily penetrate individual locations 	<ul style="list-style-type: none"> • Still in early stages of development, licensing, and deployment

Emerging Technologies

In previous Task Force reports, we have reported on many additional ways that Minnesota residents are taking advantage of broadband services than just email, Facebook, and Netflix. 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. In this report, we touch on new technologies and their reliance on broadband.

Precision Ag

The need for broadband in agriculture continues to climb. According to 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. 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.

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.

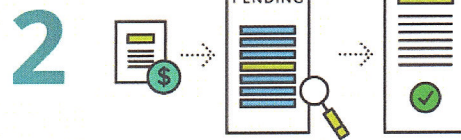
Walmart and IBM are partnering on a way to use Blockchain to track products from farm to consumer to help combat food fraud. Maersk is also partnering with IBM to leverage Blockchain to create tamper-resistant digital shipping paperwork to aid shipping supply chains. Governments are also looking to solve problems with Blockchain. The country of Georgia is using it to secure and record land transfers. Estonia is using it to create a digital identity of its citizens, and at least six different state and local agencies in Illinois are using the benefits of Blockchain to provide a thoughtful and light touch to government integration. 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.

Figure 2. Blockchain: How it works

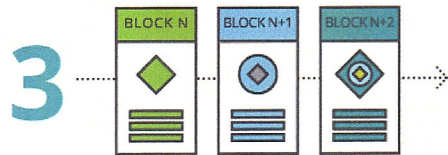
Blockchain allows for the secure management of a shared ledger, where transactions are verified and stored on a network without a governing central authority. Blockchains can come in different configurations, ranging from public, open-source networks to private blockchains that require explicit permission 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.



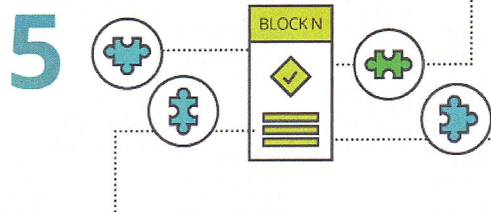
VERIFICATION Depending on the network's parameters, the transaction is either verified instantly or transcribed into a secured record and placed in a queue of pending transactions. In this case, nodes—the computers or servers in the network—determine if the transactions are valid based on a set of rules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



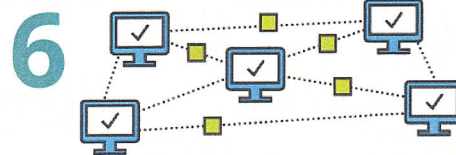
STRUCTURE Each block is identified by a hash, a 256-bit number, created using an algorithm agreed upon by the network. A block contains a header, a reference to the previous block's hash, and a group of transactions. The sequence of linked hashes creates a secure, interdependent chain.



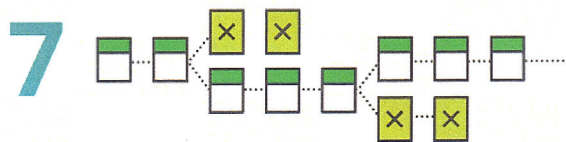
VALIDATION Blocks must first be validated to be added to the blockchain. The most accepted form of validation for open-source blockchains is proof of work—the solution to a mathematical puzzle derived from the block's header.



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 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.

Cyber Security

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 their annual Data Breach Investigation Report²⁵ 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 occur once an attacker has found an opening, most take months to discover.

We mention these to highlight the importance of the work going on within MNIT. Minnesota's chief information security officer (CISO), Aaron Call, and the state's chief information officer (CIO), Brig. Gen. Johanna Clyborne, presented to the Task Force on the topic of cybersecurity. They discussed some of the initiatives they are 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

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, whose scope of work includes: information-sharing between policy-makers, state agencies, and private industry related to Minnesota's cybersecurity infrastructure, cybersecurity workforce issues and emerging technology, to:
 - (a) develop legislation to support and strengthen Minnesota's cybersecurity infrastructure, and
 - (b) provide input or recommendations related to developing a multi-year strategic plan to secure Minnesota's IT environments.

²⁵ https://www.verizonenterprise.com/resources/reports/rp_DBIR_2018_Report_execsummary_en_xg.pdf.

they see suspicious activity. Both of these steps help to improve the security posture of the state's systems and data.

Federal policy: Future challenges and opportunities

Developments at the Federal Communications Commission ("FCC") continue to impact broadband deployment and adoption in Minnesota.²⁶ 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 will conduct a reverse auction in July and August 2018 to award \$1.98B over a ten-year period.²⁷ 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.²⁸ Several Minnesota carriers were declared eligible to participate in the auction.²⁹ 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.³⁰ 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.³¹ Congress created the FirstNet program to deliver secure, dedicated wireless network services to public safety providers. Minnesota finalized its contract with FirstNet in May 2018.³² Minnesota law enforcement, fire, emergency medical personnel and sovereign nations may now sign up.³³ "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."³⁴

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

²⁶ 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>.

²⁷ <https://www.fcc.gov/auction/903>.

²⁸ A map of eligible areas is available on the FCC website. <https://www.fcc.gov/maps/caf2-auction-final-areas/>.

²⁹ <https://docs.fcc.gov/public/attachments/DA-18-658A2.pdf>.

³⁰ <https://www.usda.gov/sites/default/files/documents/usda-fy19-budget-summary.pdf>.

³¹ <https://firstnet.gov/about>.

³² <https://dps.mn.gov/divisions/ecn/programs/wireless-broadband/Pages/default.aspx>.

³³ 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.

³⁴ <https://dps.mn.gov/divisions/ooc/news-releases/Pages/dedicated-broadband-minnesota-responders-now-available.aspx>.

the cap from \$400M to \$571M in recognition of increasing demand for 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."³⁵ 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."³⁶ The E-Rate program provides discounts to broadband services to school district facilities and libraries throughout the state, especially in rural areas.³⁷ The Task Force heard from EducationSuperHighway in May about the progress the E-Rate program has generated for K-12 institutions in Minnesota.³⁸ According to their presentation, "Only a handful of districts remain that are not meeting fiber and bandwidth metrics."³⁹ E-Rate also supports broadband access at public libraries throughout Minnesota. Funded by the state, the Telecommunications Access Equity Aid and Regional Library Telecommunications Aid programs complement E-Rate funding to provide additional support to schools and libraries, but does not support Category 2 services.

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.

³⁵ <https://docs.fcc.gov/public/attachments/DOC-351633A1.pdf>.

³⁶ <https://www.fcc.gov/general/universal-service-program-schools-and-libraries-e-rate>.

³⁷ <https://www.fcc.gov/general/universal-service-program-schools-and-libraries-e-rate>.

³⁸ https://mn.gov/deed/assets/10-may-2018-esh_tcm1045-339814.pdf.

³⁹ *Id.*

State general obligation bonding has not been used for fiber optic cable deployment. A 1994 legal opinion letter providing guidance to the Minnesota Department of Finance [footnote] 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 [footnote] letter 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 letter 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.

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.

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).

During the 2018, legislative session, at least two bills were introduced that would have expressly provided state general obligation bonding for use in the deployment or maintenance of fiber optic infrastructure. See SF3964/HF4376 (Fiber Network Extension from Willow River to Pine City and from Cromwell to Aitkin); SF1602/HF1092 (Minneapolis Veterans Home, Historic Trust Bridge). The proposed Willow River fiber network extension bill expressly anticipated the Article XI, section 5 issue with the following proposed legislative finding:

Subd. 3. General eligibility; state general obligation bond funds. Article XI, section 5, clause (a), of the Minnesota Constitution requires that state general obligation bonds be issued to finance only the acquisition or betterment of public land, buildings, and other public improvements of a capital nature. The legislature has determined that many fiber optic infrastructure projects will constitute betterments and capital improvements within the meaning of the Minnesota Constitution and capital expenditures under generally accepted accounting principles, and will be financed more efficiently and economically under this section than by direct appropriations for specific projects.

SF3964/HF4376 (Introduced 4/12/2018).

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.” The advent of driverless vehicles is also 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. General obligation bonding for broadband infrastructure is something the state might use to take advantage of existing and upcoming federal programs which require a match of federal dollars. The Task Force recommends a review of the requirements of general obligation bonding with an eye towards being prepared to take advantage of additional federal funding opportunities that could help Minnesota accomplish its 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.

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 regulation on data reporting by broadband providers, and self-reporting results in less than optimal data. Minnesota is fortunate to be in a better position on mapping than most others.

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 should receive funding separate from the program.

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, nor made considerable progress toward achieving them. 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. Review and consider state general obligation bonding as a possible additional financing tool to facilitate fiber optic cable deployment and achieve the state's broadband speed goals.
3. Adequately fund the Telecommunications Access Equity Aid and Regional Library Telecommunications Aid (RLTA).
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

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 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.

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 remains a non-partisan issue. We also hope that this report provides policymakers with at least some of the information—and policy recommendations—needed to make informed decisions.

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 promote broadband adoption and use.
2. Provide on-going biennial funding of the Border-to-Border Broadband Development Grant Program at \$69.7 million per biennium until the state achieves its broadband speed goals.
3. 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.

4. Establish a legislative cybersecurity commission, whose scope of work includes: information-sharing between policy-makers, state agencies, and private industry related to Minnesota's cybersecurity infrastructure, cybersecurity workforce issues and emerging technology, to: (a) develop legislation to support and strengthen Minnesota's cybersecurity infrastructure, and (b) provide input or recommendations related to developing a multi-year strategic plan to secure Minnesota's IT environments.
5. Provide direct funding to the Department of Employment and Economic Development for broadband mapping.
6. Review and consider state general obligation bonding as a possible additional financing tool to facilitate fiber optic cable deployment and achieve the state's broadband speed goals.
7. Adequately fund the Telecommunications Access Equity Aid and Regional Library Telecommunications Aid (RLTA).
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.

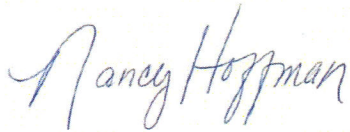
7. Modify the Challenge Process: The challenge process remains an obstacle to delivering the best network possible to communities. The Challenge Process is overprotective of incumbent providers and discourages non-incumbent providers from participating in the program over concerns their efforts will 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

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> -Arrowhead Regional Development Commission -Association of Minnesota Counties -Cloquet Valley Internet Initiative -Chisago County HRA/EDA -Citizens Utility Board of Minnesota -City of Winthrop -Cloquet Valley Internet Initiative -Coalition of Greater Minnesota Cities -Community of Minnesota Resorts -Community Technology Advisors Corp -CTC -Cooperative Network -Cooperative Network Services -Development Services, Inc -East Central MN Educational Cable Cooperative -East Central Regional Development Commission -Economic Development Association of Minnesota -EssentiHealth -Finley Engineering -Fond du Lac Tribal Communications -GPS 45:93 -Great River Energy -Greater Minnesota Partnership -Growth and Justice -Headwaters Regional Development Commission -Hiawatha Broadband Communications -IMPACT 20/20 -Institute for Local Self-Reliance -Iron Range Economic Alliance -ISD 317 Deer River | <ul style="list-style-type: none"> -Kanabec County EDA -Kandiyohi County Economic Development -League of Minnesota Cities -Mid-Minnesota Development Commission -Mille Lacs Energy Cooperative -Leech Lake Tribal Telecommunications -Lincoln County EDC -Meeke County EDA -MN Association of Community Telecommunications and Administrators -Minnesota Association of Professional County Economic Developers -Minnesota Association of Small Cities - Minnesota Association of Professional County Economic Developers -Minnesota Association of Townships -Minnesota Farmers Union -Minnesota Library Association -Minnesota Municipal Utilities Association -Minnesota Public Broadband Alliance -Minnesota Rural Education Association -Minnesota Rural Electric Association -Minnesota Soybean Growers Association -MN River Valley Education District -MN Rural Counties Caucus -MVTV Wireless -National Joint Purchasing Alliance | <ul style="list-style-type: none"> -Nemadji Research Corporation -Nobles County Economic Opportunity Network -North Region Health Alliance -North Star Township -Northland Foundation -Northwest Minnesota Foundation -NW Regional Development Commission -PCs for People -Project FINE -Range Association of Municipalities and Schools -Redwing Ignite -Region 5 Regional Development Commission -Region Nine Development Commission -Sherburne County EDA -Schools for Equity in Education - Southern Minnesota Beet Sugar Cooperative -Southern Minnesota Initiative Foundation -Southwest Initiative Foundation -Southwest Regional Development Commission -Turtle Island Communications -Treacy Information Services -Upper Minnesota Valley Regional Development Commission -West Central Initiative |
|---|--|--|

Appendix B: 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](#)