BROADBAND IN SOUTH DAKOTA

—— MAY 2019 ——

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BROADBAND IN SOUTH DAKOTA

Excerpt from Governor Kristi Noem's State of the State Address: January 8, 2019

I've heard it said that 65 percent of children in elementary school today will work in jobs that don't yet exist. These jobs of the future – the jobs our children will depend on to support families of their own – will almost certainly require access to technology, particularly the internet. We must make those investments now. Raising the next generation with tools such as broadband is our responsibility.

South Dakota's lack of broadband is a big problem to tackle. Half our counties have rural areas where one in four people don't have adequate Internet access. Some counties have rural areas where half the residents don't have reliable access. We must close the broadband gap to ensure South Dakotans can work and hire locally while selling globally.

That's easier said than done. Fiber optic line can cost $15,000 per mile to lay, and the low number of customers in some rural areas makes it too expensive for companies to justify their investment.

Some have discouraged me from even trying to expand access across the state because it's too hard and too expensive. But I refuse to quit. Geographic location cannot be an excuse for the government to do nothing when the future vitality of our economy is at stake. Geographic location no longer has to be a barrier to participating in the global economy.

Earlier this month, I announced my plan to close the broadband gap. Partnering with others, I want to connect as many more South Dakotans as possible to high speed internet over the next four years.

To accomplish this goal, we'll bring together industry leaders. Our state's rural telecom companies, in particular, have considerable experience in bringing broadband service to our rural areas. Our state's other wireline service providers have an important role to play in areas they serve as well, and I look forward to working with them on increasing their level of service.

What's more, I want to bring in companies with emerging technologies in the fixed wireless arena that may offer more cost-efficient ways to provide fast, reliable service to our most difficult to serve locations. And I see a role for companies ready to invest in new 5G technology, which promises faster, more reliable service over cellular data networks.

Additionally, we're going to commit state resources to closing the broadband gap. But we can't, and shouldn't, exclusively rely on those to get us across the finish line, so we're developing a series of public-private partnerships to help overcome the challenges of service in rural areas and achieve the ambitious goals we've set for South Dakota.

I'm confident we can find a way to bridge our own challenges and secure broadband for South Dakota's next generation and beyond.

BACKGROUND ON SOUTH DAKOTA

- 77,811 square miles, 17th largest state in geography
  - The Black Hills consumes approximately 8,000 square miles

- 2015 Population estimate of 858,469. SD is 1 of 5 states with population < 1M.
  - Sioux Falls is the largest city at 170,533
  - Rapid City is the 2nd largest at 72,817
  - Aberdeen is the 3rd largest at 27,837
  - Watertown is the 4th largest at 22,037
  - South Dakota's communities get small very quickly.

- 46th largest in population, or 5th smallest.

- 75% of population lives in an urban environment

- 25% of population lives in a rural environment

- 339,458 households

- 10.7 persons per square mile

- 91% of population is a high school graduate or higher

- 85% of households have a computer
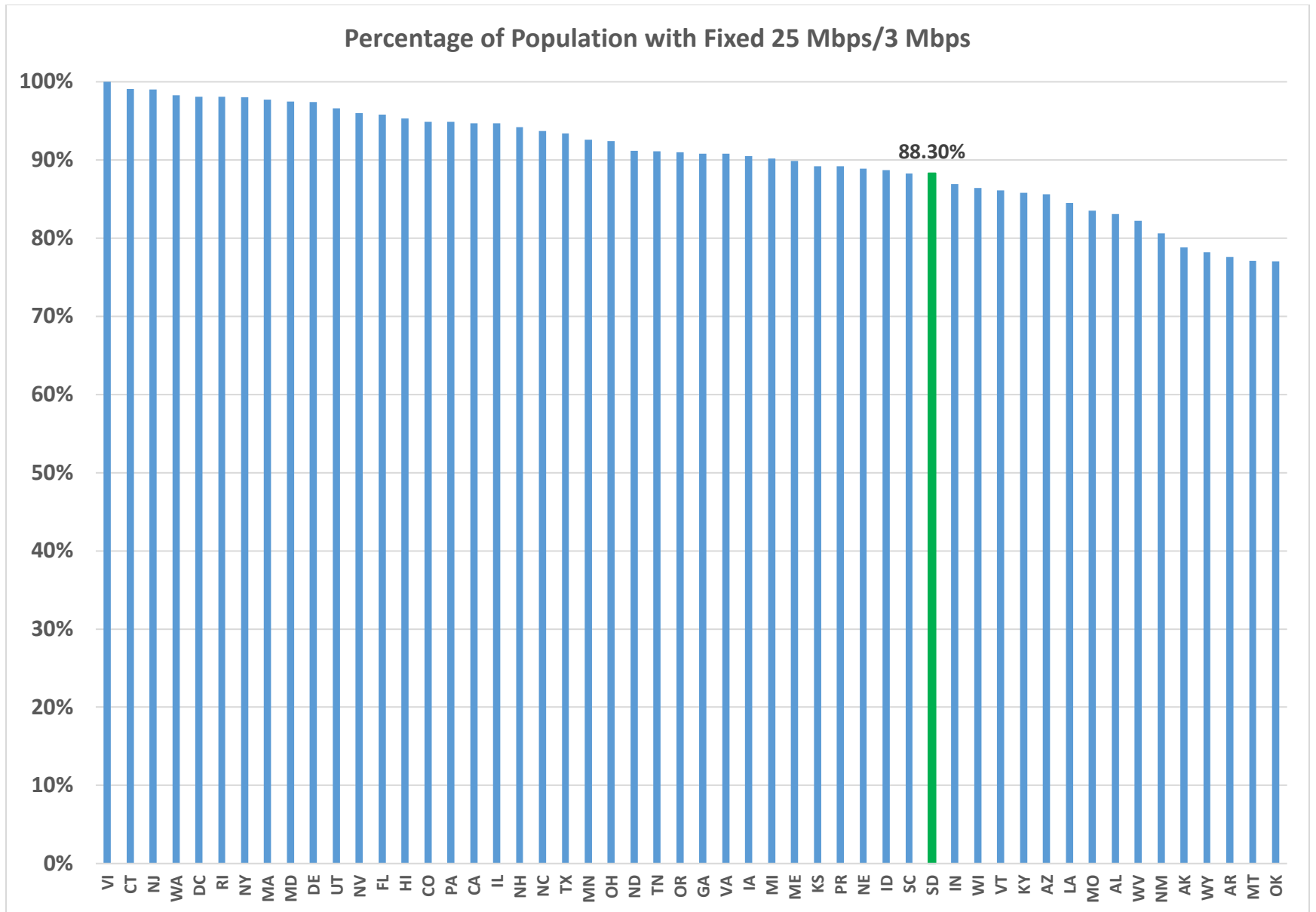
SOUTH DAKOTA BROADBAND GOALS

1. The primary goal of any Broadband Plan must be to increase the availability of high-speed broadband for our constituents and businesses. The Federal Communications Commission (FCC) standard is 25 Mbps download and 3 Mbps upload (25/3). The most important goal is for <u>every</u> South Dakota citizen, business and community institution to have access to the current broadband standard by 2022. South Dakota ranks 35th in the country with an average download speed of 17.38 Mbps, while first place sits at 36.69 Mbps. The largest communities in the state have access to Gigabit service. We need to grow that capability throughout the state to reach first place.

   When the FCC speed standard changes – our telecommunications industry must be able to adapt to that changing standard and keep our citizens current. Broadband technology must be future-proofed to the degree possible. According to the FCC and the 2016 Broadband Deployment Report:
   - 88% of South Dakotans have access to 25/3 terrestrial services.
   - 41% of South Dakota counties are at 90% or above for their population have 25/3 access.
   - Five counties have 100% 25/3 access across the county. Brule, Faulk, Hyde, Potter and Sully.
   - Dewey (1.7%), Ziebach (12.1%) and Harding (24.6%) counties have the least amount of population with broadband access.

   The goal is to move South Dakota from 36th in the country to 1st.

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Percentage of Population with Fixed 25 Mbps/3 Mbps

2. Our technology infrastructure leads the country in K-12 and higher education markets. The K-12 minimum connectivity speed for a school is 100 Mbps, and 95% of public K-12 school districts meeting or exceeding the 1 Mbps per student standard in the 2019-2020 academic year. The Higher Education minimum is 10 Gbps. We must continue to ensure our students are not limited by slow or inadequate broadband services.

3. Ensure access to state and municipality-owned assets is available. Rights-of-ways, poles, towers and other vertical assets offer unique opportunities. To maximize efficiency, we must minimize bureaucracy.

4. South Dakota state government has a long history of a business-friendly environment. According to CNBC, we have been identified as the second-best business-friendly environment state in the country, indicating that our regulation environment is minimal and easy to navigate. We must continue to retain this emphasis on business-friendliness.

5. Enhance first responder communications. South Dakota is already unique with a statewide communications system used across municipal, state, federal, tribal, and other first responders. That success must be leveraged to include all manners of information and communication through multiple technologies.

6. Support of and access to state and federal broadband financial programs accelerates infrastructure investment across South Dakota. We must demonstrate the success these programs have to our congressional delegation and state legislators for continued backing.

BROADBAND IN SOUTH DAKOTA

SUMMARY

Broadband in South Dakota is in very good condition, but it is not ubiquitous. Many areas of the state have high-speed broadband opportunities from multiple providers. In the 21st century, if we want all citizens to be successful, we cannot allow anyone to be left on the wrong side of the digital divide.

The population centers of the state can easily make a business case for the financial justification needed for broadband services. Our rural and frontier areas need the attention for broadband investments. In some cases, that rural aspect might not be any further than a mile or two outside of town, though.

The FCC's established a minimum standard for broadband speeds at 25 Megabits per second (Mbps) download and 3 Megabits per second upload, a standard that we share in our program. Broadband is an exploding technology and solutions must have the ability to grow to 100 Mbps, 1 Gigabit per second (Gbps), even 100 Gbps. It is critical that the technology installed today meet future technology demands.

Solutions today include fiber optics, hybrid fiber-coax, fixed wireless, satellite and mobile wireless. Different technologies provide advantages and disadvantages. South Dakota must pursue those technologies with the greatest sustainability. The most effective technologies utilize fiber optics somewhere in their delivery network. Though it offers the greatest long-term potential, it is also the most expensive and slowest to implement. According to the South Dakota Telecommunications Association, over 70% of their rural members will achieve 100% fiber services throughout their area by 2021. Hybrid fiber – coax solutions are quite common and deliver high speed solutions. Midco, Inc. is regularly identified as one of the top regional Internet Service Providers. Both technologies can scale to gigabit speeds or higher. Fixed wireless technology continues to improve as a potential solution. Mobile wireless has the convenience of portability with the challenge of ubiquitous, reliable coverage.

Across the United States, Internet usage amongst adults has grown from 50% in 2000 to 89% in 2018. While the highest adult age group is 18 – 29 with 98% utilization, the lowest group categorized are adults over the age of 65 at 66%. We must ensure that any individual wanting to use the Internet, have the facilities available to utilize wherever.

Broadband competition exists only in the largest cities, offering broadband choices to those citizens. Most South Dakotans communities do not have real choices for competition, though. The business case of over-building facilities in most of South Dakota does not provide for a realistic return on investment. At a minimum, we must be able to provide at least one legitimate option for consumers and business to subscribe to dependable high-speed broadband.

WHY BROADBAND?

Broadband in the 21st century is akin to electricity in the 20th century. Regardless of your residence or socio-economic status, consumer or business, it is a requirement to successfully navigate today's world.

- Consumers rely on broadband for communications and entertainment. Maintaining relationships with family and friends becomes exponentially more valuable from broadband. Increasingly, Internet of Things (IoT) devices populate more homes for safety and convenience. Streaming audio and video services along with social media participation is dependent on high-speed broadband services. Current weather, road conditions and construction efforts in a four-season state like South Dakota can be critical for survival.
- An informed citizen is a greater contributor to our society. Digesting local information while differentiating real news from fake news can increase community involvement.
- The Homework Gap in broadening. Schools are increasingly basing more curriculum online. The proof of this is the population of students using computers at your local library after the school day is completed. Public computer labs are regularly filled with students completing assignments. Some students travel with Mi-Fi's to out-of-town activities to be able to complete homework in a timely manner.
- Access to student's classroom performance data through the state's DDN Campus performance portal is based on broadband access for parents and guardians. Holding students accountable for their scholastic performance and progress is important in our culture.
- Businesses rely on broadband in multiple manners. Online store fronts, brick 'n mortar transactions, tracking inventory, marketing, information technology support and "free wireless" services are just a few businesses uses.
- Remote workers are becoming very popular, as individuals want to choose where to live while maintaining a successful professional career. For citizens in a state like South Dakota, there are considerable advantages to having the ability to work in our rural setting while the main office resides in Sioux Falls, Omaha, or Los Angeles. Collaboration and effective communication tools are critical to a successful telecommuter. Employment opportunities as a remote worker are wholly based on the opportunity to consume high-speed, reliable bandwidth for the home.
- Telehealth services do not exist without high speed broadband. Virtual office visits, immediate transfer of test results, education and remote patient monitoring drastically improve in quality with high speed broadband services.
- First Responder's provide protection and life-sustaining services via broadband. The FirstNet national network and Next Generation 911 services are based on ubiquitous high-speed data services.

PROBLEMS

The most glaring issue with broadband services is the "last mile" connectivity, the wiring from a provider's network to the residence or business. Historically, a common network design was to utilize fiber optics as an aggregation "middle mile" technology while feeding end-locations with copper. Originally, all last mile connectivity was based on copper wiring. The physics of copper limit the distance of the signal strength for delivering high-speed broadband services. Telecommunications systems were designed to deliver voice technology which has much smaller bandwidth requirements than Internet services. When broadband was layered on top of existing voice services, connectivity was prioritized over speed. As technology has evolved, the ability to decrease the length of the copper portion of the circuit greatly increases the speeds able to be delivered to a home or business.

Residents and businesses in most South Dakota cities and towns have high speed broadband available, though there are some entire communities that do not have adequate broadband services. Problems more commonly begin outside the city limits and in some cases immediately upon leaving the city / town boundaries. Certainly, some of the frontier areas of the state have challenges due to their distance from a community. According to the 2018 Connecting South Dakota's Future Broadband Report (published by the South Dakota Telecommunications Association), 4% of Americans in urban areas do not have access to broadband. 39% of rural residents do not have access.

The primary detriment in expanding broadband is the upgrading of facilities to the household or business. Replacing the original copper cabling with newer copper or fiber optics is expensive. Industry experts estimate fiber installation costs of $16,000 per mile in rural areas and up to $60,000+ per mile for urban areas and the Black Hills. Boring fiber through soil is much cheaper than the Black Hills' granite or downtown Sioux Falls. Those costs become the significant aspect of the one-time costs for services. Fiber optics, copper cable and conduit are a small percentage of the overall deployment costs.

Local exchange boundaries are also a contributing factor to the terrestrial broadband problem. If you live near the border of your telecommunication's providers service area and the provider has no interest in extending their service that far, you are in a very difficult position. That situation can occur as close as being on the 'wrong side of the road'. In other situations, a homeowner may be able to "see" the broadband pedestal across their land but be unable to utilize it because it is another provider's territory.

In some situations, cellular technology can provide services to these rural or frontier areas. Determining coverage from those service providers is difficult as coverage maps are frequently overstated. Costs and consistent broadband speeds are also difficult to predict.

Unserved and underserved areas of the state occur when the provider is unwilling to invest in their service territory. Like any homeowner, if maintenance and repair activity does not regularly occur in the upkeep of a house, the value will begin to deteriorate.

The pure economics of building a high-speed broadband infrastructure lead to difficult business decisions. The geography of the state lends itself to many miles of open range with sparsely populated areas. A business case for these areas without subsidies and assistance is impossible to justify. 4.48 residents per square mile of rural SD population provides less business recovery opportunities than the 2,490 residents per square mile of Sioux Falls.

Problems also occur because accurate speed data is difficult to obtain. Carriers are not required to report actual service speeds delivered. Reporting requirements are based on "advertised" speeds

available. Carriers sometimes overstate the actual services available or in some cases simply make reporting mistakes leading to doubts as to the accuracy of available data.

The primary problem of achieving 100% ubiquitous broadband coverage in our unserved and underserved areas is the cost of providing the service when compared to the business return on investment.
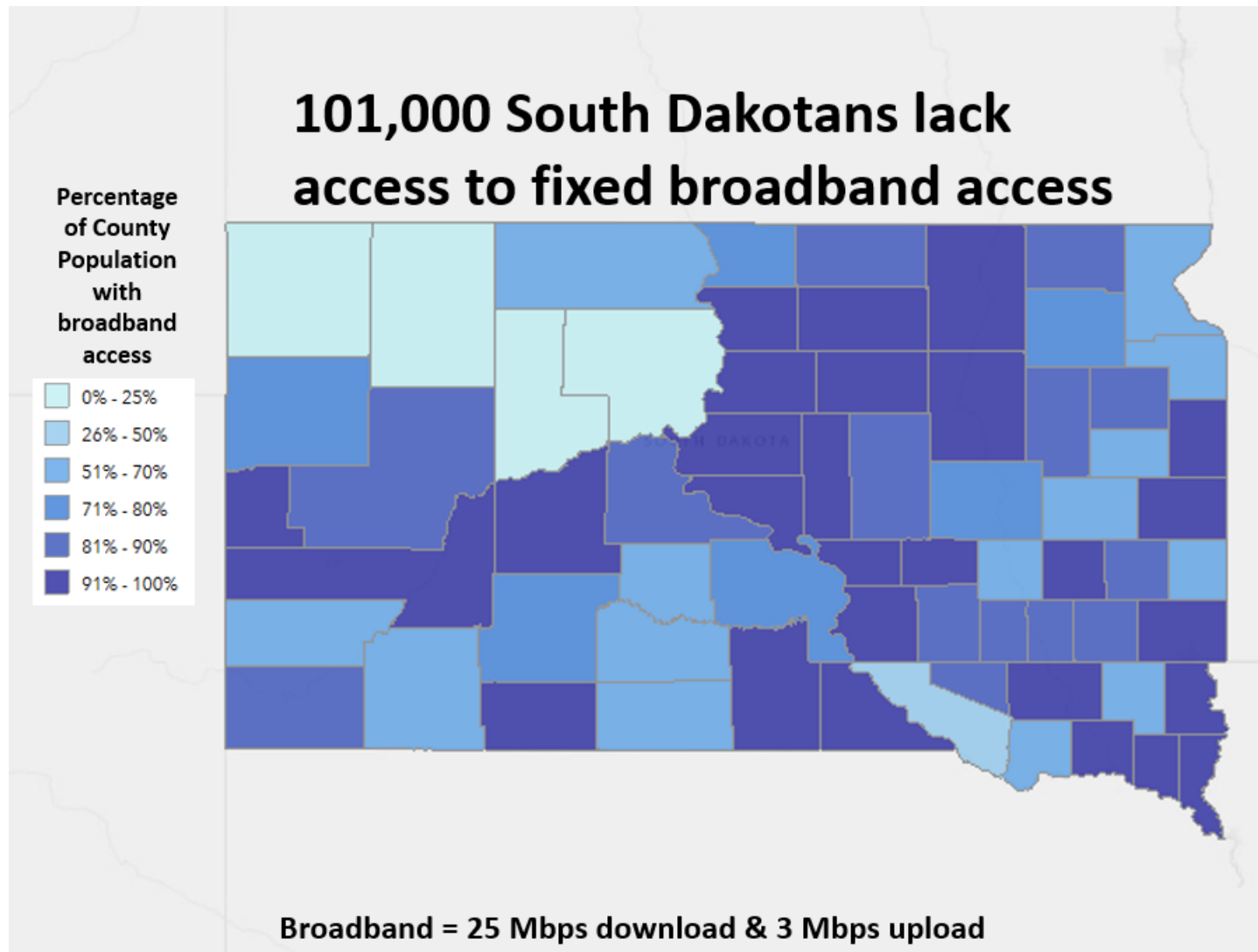
Figure 1 - County-level broadband availability at 25 Mbps \ 3 Mbps

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INDUSTRY SYNOPSIS

South Dakota is well served by most of the telecommunications industry. There are 35 Eligible Telecommunications Carriers registered with the Public Utilities Commission (PUC). There are 86 competitive local exchange companies listed by the PUC. Following is a summary of the larger partners.

CenturyLink
CenturyLink has been an incumbent provider in South Dakota since the days of Northwestern Bell Telephone. The availability of high-speed broadband is concentrated in densely populated areas. CenturyLink is the incumbent local exchange carrier for over 25 cities and towns in the state.

CenturyLink's broadband offerings in South Dakota have historically been limited to Digital Subscriber Line (DSL) services and speeds. Traditionally, the former Bell-system company has not participated in Federal broadband subsidy programs. Since 2015 though, CenturyLink has received $88,772,640 for deploying to over 18,000 locations in South Dakota through the Connect America Fund programs.

Midco
Midco (f.k.a. Midcontinent Communications) serves 66 South Dakota communities and counties across the state including Aberdeen, Huron, Mitchell, Pierre, Rapid City, Sioux Falls, Vermillion, Watertown, and Yankton. They cover most of the population centers in SD, but a minimal amount of geography.

Internet base speeds vary from 100 Mbps download/10 Mbps upload to top speeds of 1 Gbps download/20 Mbps upload using hybrid fiber-coaxial technology. Business speeds reach 100 Gbps. Midco is regularly rated as the fastest service provider in the region and across the country. Midco is expanding their service offerings to included fixed wireless soon. 100% of Midco customers have 25/3 broadband available to them.

Midco estimates $44M in broadband investment in SD from 2018 – 2021.

South Dakota Telecommunications Association (SDTA) and SDN Communications

SDTA & SDN are representative of the independent telephone companies across the state. Most SDTA members are also owners of SDN. SDTA/SDN serves 77% of the state's geography with only 30% of the population. They have made significant investments in fiber services. These members have completed or set targeted dates for being 100% completed with their fiber-to-the-home projects.

Alliance Communications (2017)	Midstate Communications (2017)	Venture Comm. (2017)
Beresford Municipal Tele. (2021)	RC Technologies (2021)	West River-Bison (2021)
Cheyenne River Sioux Tribe (2017)	Swiftel Communications (2017)	West River-Hazen (2021)
Interstate Telephone Co. (2021)	TrioTel Communications (2017)	
Kennebec Telephone Co. (2021)	Valley Telecomm. (2017)	

Here is the status of their remaining members by 2021:

Faith Municipal Telecom. TBD	Fort Randall Telephone (40%)	Golden West Tele. (90%)
James Valley Telephone (60%)	Santel Communications (85%)	

From 2013 – 2017, the 18 SDTA members invested nearly $392M in capital improvements in South Dakota. Approximately 93% of their access lines will be fiber-based by the end of 2021. SDTA member companies anticipate building roughly 8,000 miles of new fiber in the four-year span from 1/1/18 until 12/31/21 which will result in approximately $305 million in new capital infrastructure investment during that time. 76% of SDTA customers have speeds of 25/3 available to them. By 2021, the expected base will vary from 50 Mbps to 250 Mbps to 1 Gbps.

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SDTA & SDN are primarily terrestrial-based companies with some members offering fixed wireless. SDTA members use fiber-based and DSL technologies. SDN provides up to 100 Gbps business services.
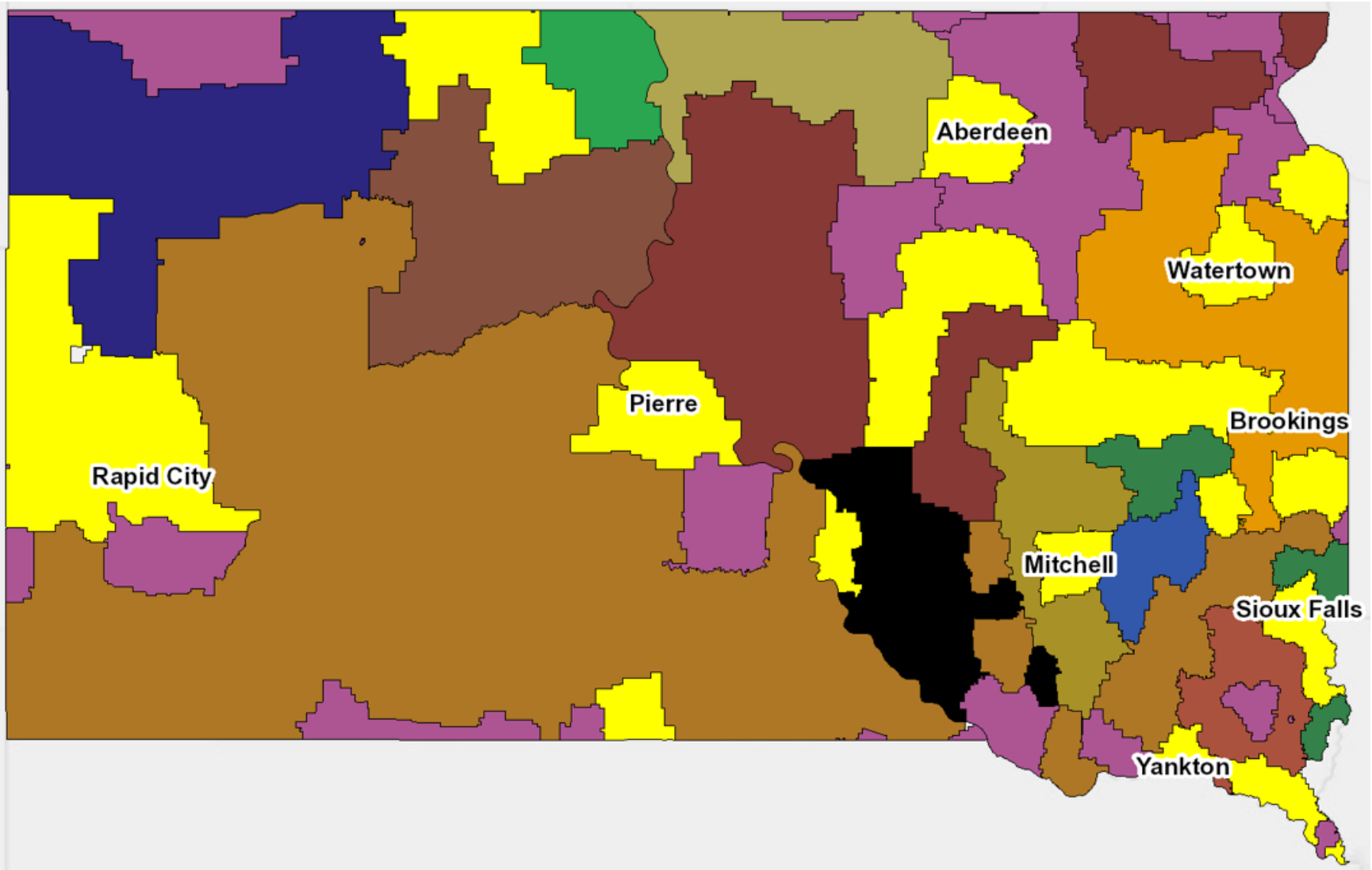
Vast Broadband

Vast Broadband serves 35 South Dakota communities located in the eastern and western edges of SD. Some of the larger South Dakota communities include Belle Fourche, Canton, Deadwood, Flandreau, Harrisburg, Lennox, Madison, Rapid City, Sioux Falls, Spearfish, Sturgis, Tea, Watertown, and Yankton. Vast is the incumbent local exchange carrier (ILEC) in the Irene area of the state and competitive local exchange carrier (CLEC) in the rest of their serving areas. Vast primarily uses Digital Subscriber Line (DSL) for their rural broadband technology, hybrid fiber-coax for in-town technology and a Long-Term Evolution (LTE) wireless offering off three towers in the Beresford, Lennox & Parker areas.

Internet packages are offered with speeds ranging from 100 Mbps to 200 Mbps in their CLEC area. Their ILEC area is not nearly as populated with below broadband speeds. Vast has plans to build out to 25/3 broadband throughout most of their ILEC area by 2023 with fiber to the pedestal. They are currently appealing a decision by the FCC regarding "orphan" census blocks not being funded by the Alternative Connect America Cost Model (A-CAM). Those orphans are in the Tea, Parker, Lennox, Irene, Wakonda, and Beresford rural areas.

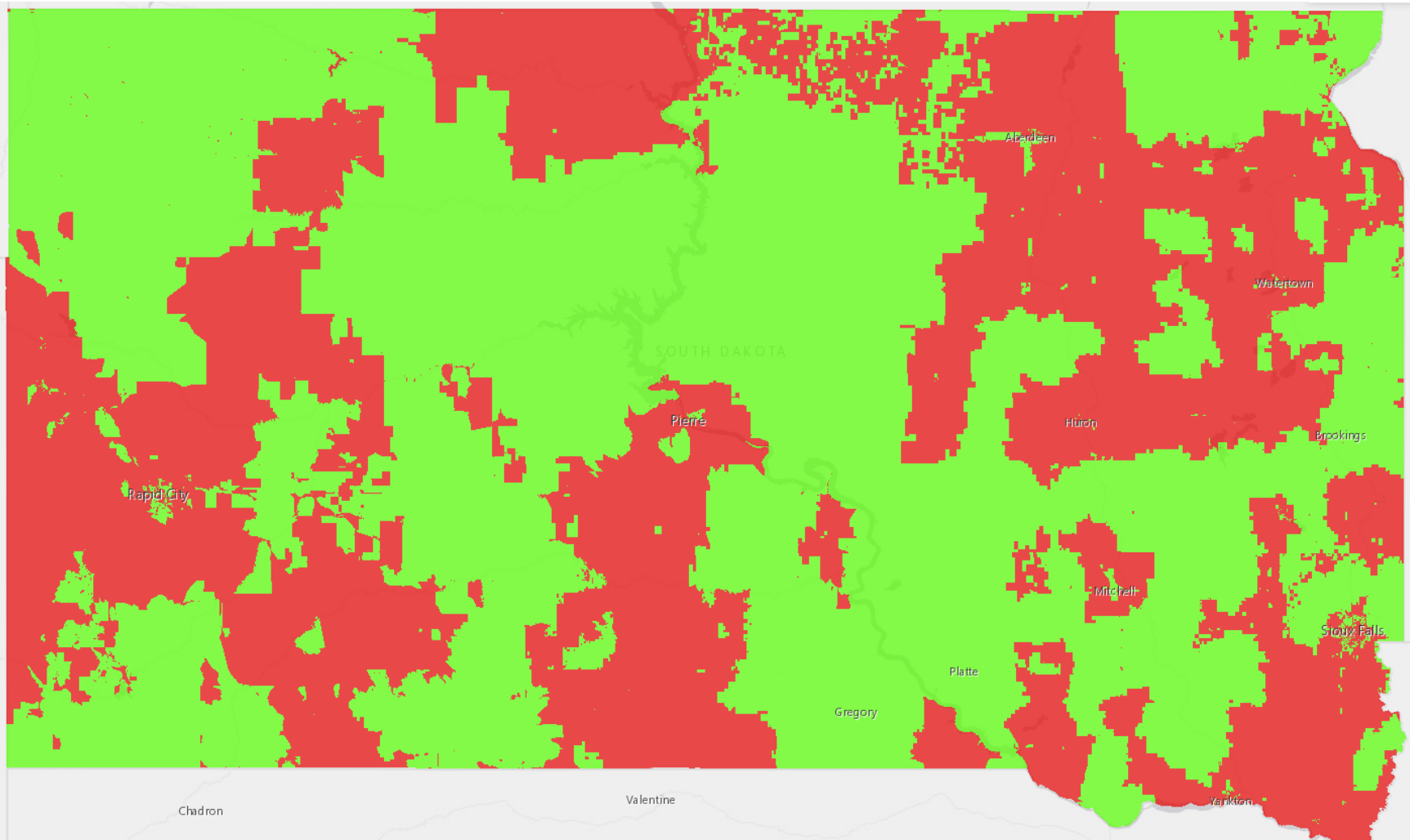Vast estimates broadband investments of $20.4M from 2018 – 2023 in SD.

The map breaks down the incumbent local exchange territories serving the state.

South Dakota has a healthy supply of fiber optics to the residence. At least 65% of South Dakota residents are served by fiber to the home. Green represents fiber availibility at the residence or business.

TECHNOLOGY SOLUTIONS

Many of South Dakota's providers have done extensive work to improve service for their customers. Providers that have invested in fiber-optic based technologies or hybrid-fiber technologies, such as modern cable modem systems, are well-positioned to meet or exceed today's desired and tomorrow's expected speeds.

Technologies such as DSL are often cited as readily available over existing telephone lines, which helps reduce the upfront costs, but are quickly falling behind in speed. Many previous DSL providers in South Dakota have abandoned this technology in favor of fiber or cable modems.

Wireless broadband delivery across South Dakota varies in the ability to reach modern speed expectations. Some older installations reach areas with broadband that works for basic web usage and email but struggle with advanced usages such as two-way video conferencing and tele-health. Newer fixed wireless options are promising the performance characteristics of wired technologies.

Fifth-generation wireless broadband (5G) networks are the next generation of mobile internet connectivity, offering faster speeds and more reliable connections than ever before on smartphones and other devices. With development well underway and testbeds already live across the world, 5G networks are expected to launch across the world by 2020, working alongside existing 3G and 4G technology. There is plenty of hype surrounding 5G today, but there is also a lot of work to be done before it is widespread. The carriers need to build out the network, and the devices need to have the 5G capabilities built in. Your existing mobile devices will not be able to take advantage of the faster speeds and it will require a new device purchase.

5G presents the potential to create new high-tech jobs and create new economic opportunities, helping curb the trend of companies choosing only cities for new headquarters and campuses. 5G allows companies to look beyond major population centers. Combining cutting-edge network technology and the multitudes faster connections will allow any company needs and employees the abilities to stay online no matter where they are.

The networks will help power a rise in IoT technology, providing the infrastructure needed to carry large amounts of data, allowing for a smarter and more connected world. Cities can now plan for smart-city initiatives.

With the hype, though, patience will be required since several 5G issues need to be resolved. For example, who has and controls the 5G spectrum? Do we have or need spectrum sharing? What cities or towns get 5G first? Then in the community, where do the small cells (poles) go?

The federal government, states, and locals all want to influence where small cells are located. This too goes back to spectrum sharing. If four competing vendors can offer 5G services in a given city, does that mean there will be four poles in rights-of-ways every block? Will there need to be four separate fiber trenches to each pole? Will it be 4 different fiber backhaul vendors? Or will one cell be capable of handling four different vendors? Like most technology advancements it will all work itself out over time, in the meantime, it appears that we will have different levels of 5G service for the next few years at least. With these issues, can state government provide a leadership role in the assisting of these policies?

Will 5G be built out and used in rural areas as well as in the major metro areas? In some of our rural areas with existing broadband we already have high-tech opportunities, but with 5G it may revolutionize existing rural jobs, especially in agriculture. With high-speed broadband we can improve on our citizens abilities to create, innovate, research, and work through-out our state. The work from a home office (or on the road, or in a tractor) becomes more of a reality with broadband and especially 5G. In South Dakota our biggest economic driver is our agriculture economy. The

technology can make the agricultural process more efficient by allowing quicker transfer of data to provide information about weather, crops, markets, yields, or equipment maintenance needs directly sent to the dealer while operating from the field. By helping farmers understand more about where they operate, especially through deploying IoT sensors, 5G will improve the agriculture economy.

To deliver the promise of this technology we must continue to scale our communications infrastructure. The investments include the building of infrastructure capable of providing high-speed, expandable technology. Metro, near-metro and the rural countryside must have a scalable infrastructure to support the high-speed small cells. This infrastructure needs to be an extensive secured backbone that can deliver instantaneous connectivity from any device, IoT sensor, autonomous vehicle, robot, or simply a smartphone.

Smart public policy and committed government partners must be coordinated with these technology improvements. Cities, towns and associations must weigh the regulatory environment implications against the technology benefits.

1. South Dakota Grant Program Options

    The State of South Dakota is offering a $5M grant program to improve broadband services across South Dakota in 2019. The goal is to increase this amount in subsequent years but that will be a priority and economy-drive decision. If expanding broadband has been identified as an opportunity across the state, the state itself must take the step of investing in the solution.

The requirements for participation in the grant process include:

- Willingness to provide a minimum of 50% financial match from the provider;
- A minimum speed offering of 25 Mbps download speed and 3 Mbps upload speed per subscriber (25/3);
- Ability of the technology to grow as needs expand;

The criteria for awards will be based upon a variety of important criteria:

- The population of residents and businesses impacted;
- The speed of the broadband being implemented;
- Provider investment - the greater the percentage of investment exceeding 50% will gain additional points;
- Readiness of projects that will be completed in the current funding year;
- Analysis of unserved or underserved broadband services based on the Federal Communications Commission broadband standard of 25/3;
- The number of critical community facilities served;
- Community support through the number of pre-subscribers signing up.

2. State Government, Broadband and the Anchor Tenant Role

The telecommunications industry in South Dakota has an admirable history of providing broadband services across our state in both rural and urban areas. Urban populations commonly have multiple wireline providers available while the rural towns are served via a single wireline provider. We have areas of the state that are suffering from being on the wrong side of the digital divide, though. Some companies have been slow, some glacial-like, to respond to the exploding world of broadband.

Wireless coverage follows the same template. There are three major providers with different areas of strength. Urban areas have solid coverage while the rural and frontier areas are spotty.

Broadband speed is defined by the FCC as 25 Mbps download and 3 Mbps upload. Download speeds are more important from a consumer perspective, as most of one's Internet usage is retrieving information _from_ the Internet. It takes a small amount of data to request information (upload) while the response to that request typically consumes much more bandwidth. Schools and businesses may require a more symmetric bandwidth.

South Dakota has a successful history of being technologically advanced. We were the first state in the country to wire all our K-12 schools for broadband connectivity. In 1996, Governor Bill Janklow recognized that if our students were going to compete in a world economy, they would need the necessary tools and information. Every school building in the state was wired with electrical and computer cabling. We are the only state in the country to utilize inmate labor to perform the work at a fraction of the $100M original estimate.

Following that project in 1999, Governor Janklow initiated the Connecting the Schools project by providing schools with technology to access to the Internet. This project was the genesis for building broadband facilities across urban, rural and frontier aspects of South Dakota. Schools were first connected at 1.5 Mbps to the Internet. Today that speed has grown to a minimum of 100 Mbps with some districts exceeding 1 Gbps. The buildout established state government as an anchor tenant for telecommunications providers to then offer broadband services to the private sector. That same anchor tenant theme has grown over the years as technology has been revolutionized, costs decreased, and demand skyrocketed.

The anchor tenant approach was again leveraged in 2008 by Governor Rounds. He approved the Research, Education and Economic Development (REED) Network as a public – private partnership with state government, the South Dakota Board of Regents and the telecommunications industry. REED was a multi-10 Gbps network connecting the public university campuses along with the EROS Data Center and Sanford Underground Laboratory to each other and national research networks. Aspects of the REED network have been upgraded to 100 Gbps in 2019.

The history and background across South Dakota demonstrate that when broadband has been kept current with modern technology, significant accomplishments can be made.

The State of South Dakota maintains a wide and diverse inventory of broadband services across the state in support of state government, public K-12 education, and public higher education with our Board of Regents (BOR) customers. The State has procured and operates over nearly 700 broadband circuits from South Dakota broadband providers.

Broadband speeds subscribed to are dependent upon availability of services and the broadband needs of the officer, school, or university being connected. Our smaller circuits, those less than 50 Mbps download, are commonly seen in state government offices with either limited number of personnel present onsite or applications that do not transfer large amounts of data. Faster circuits, ranging from 50 to 1,000 Mbps, are found in larger government offices and offices with staff that frequently transfer large amounts of data.

All public K-12 school districts can participate in the Digital Dakota Network (DDN), funded by the South Dakota Department of Education (DOE). Members of this voluntarily project receive

broadband services funded by DOE in-line with their 1 Mbps+ per student goal. South Dakota's public-school districts have broadband circuits ranging from 100 Mbps in the smallest districts up to 10 Gbps in the largest districts as of the 2018-2019 academic year. These speeds are reviewed, compared against the 1 Mbps per student goal, and adjusted annually.

South Dakota's public university system, operated by the Board of Regents, connects to a state-funded program known as the Research, Education, and Economic Development (REED) Network. The REED Network, which is fully connected to both the DDN and State Government networks, operates a minimum of five (5) 10 gigabit per second fiber wavelengths per university for connection to the public Internet, advanced research networks, and university peers. Several university networks have been upgraded to 100 gigabits per second in 2019, along with connections to external states and university network systems.
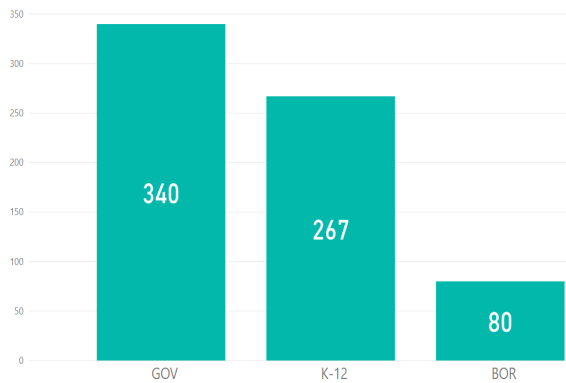

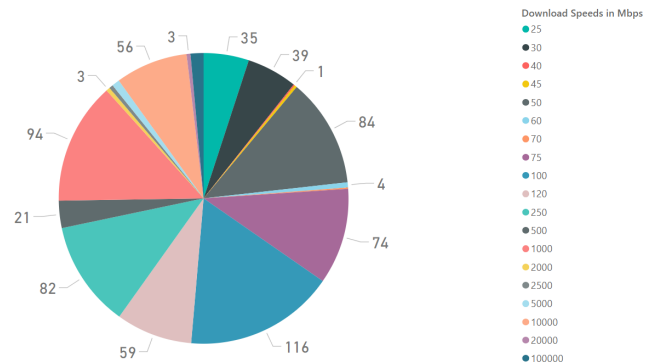Figure 2 - Count of Circuits by Group

Figure 3 - Count of Circuits by Download Speed in Mbps

3. Government Assets

State government has a variety of assets available to promote the expansion of broadband. Rights-of-ways within highways are readily accessible as are vertical assets within state government.

The South Dakota Department of Transportation has adopted administrative rules governing the location of utilities within state highway right of way. ARSD 70:04:05 covers Utility accommodations on non-interstate rights-of-way and ARSD 70:04:05.01 covers Utility accommodations on interstate rights-of-way. This relaxed regulatory environment supports the expansion of utilities in publicly available resources. Statutorily, this is defined as:

31-26-22. The Transportation Commission may promulgate rules and the Department of Transportation may issue permits, to allow electrical lines, pipelines, communication lines and other utilities, including rural water service pipelines, whether above or below ground, to operate the facilities over, under, or along public grounds, streets, alleys and highways under its jurisdiction in this state. Any rule promulgated pursuant to this section shall set forth application and issuance of permit criteria and installation standards necessary to preserve a safe traffic environment, the appearance of the highway, and the efficiency and economy of highway maintenance and shall be promulgated pursuant to chapter 1-26. Proof of compliance with the requirements of the applicable National Electrical Safety Code standard establishes due care in the defense of a negligence claim alleging a violation of that standard.

State government has an inventory of vertical assets available for broadband expansion. The public – private sector partnership has been a historical success. Leveraging available facilities when needs intersect provide for a win-win scenario. Services to the public can be expanded while providing additional revenues offsetting costs for state government.

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This map identifies broadband across the state. Blue is locations served by the FCC broadband standard of 25 Mbps download or greater. Light blue are locations not meeting the FCC standard.

Maximum Advertised Download Speed - Alternate

- < 25
- >= 25
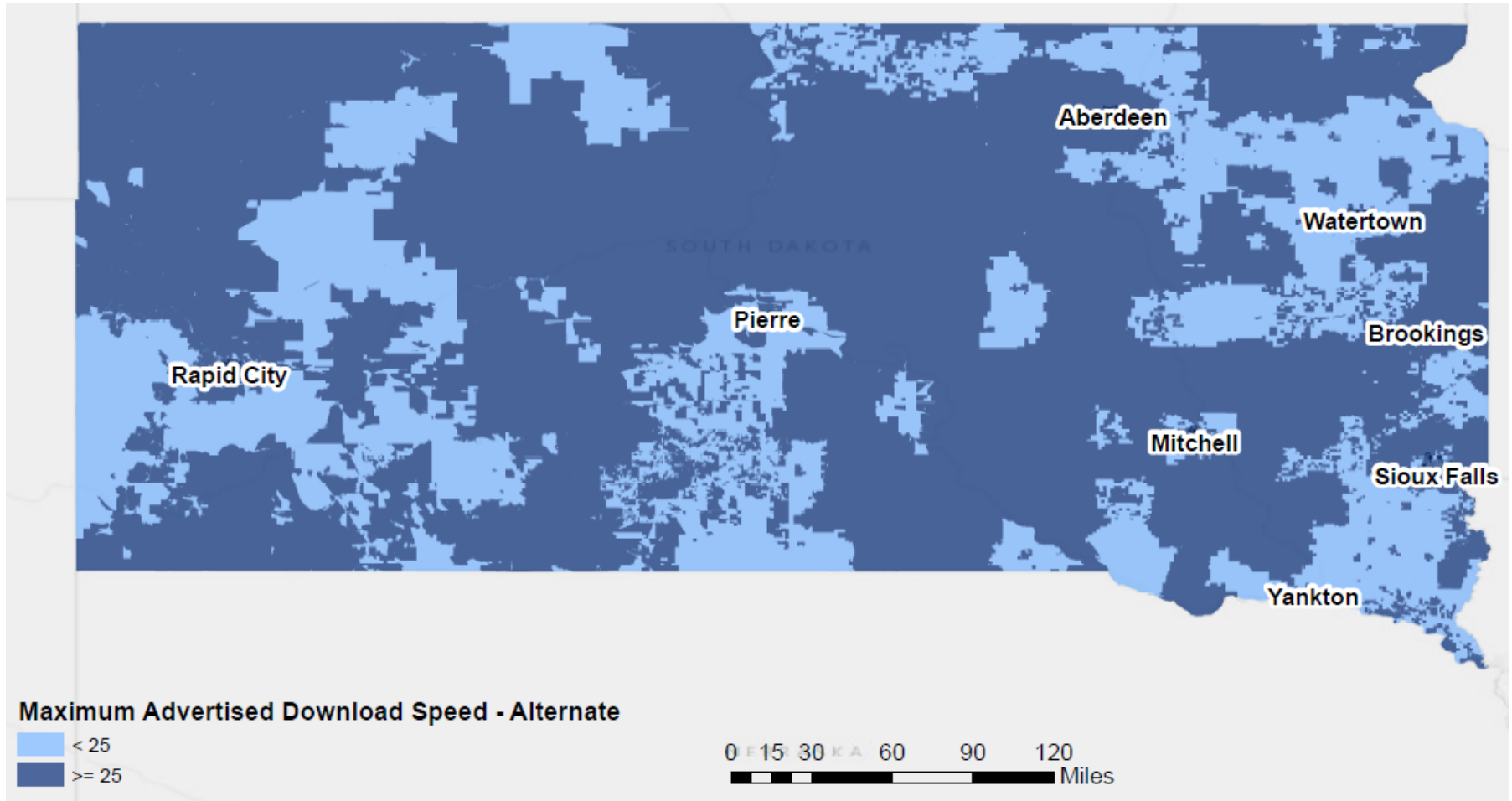
4. Business Friendly Environment

A business-friendly environment today requires that high speed broadband be available wherever the business might be located. The 2019 broadband grant program provides incentives for proposals to include businesses in their build-outs. Tax factors in the business environment include for broadband expansion include:
    #2 Business Tax Climate – Business Facilities Magazine (2018)
    #2 Best State Tax Climate – Tax Foundation (2018)

Businesses recognize our Midwest work ethic:
     #2 Best State for Business – 24/7 Wall Street (2018)
     #2 Business Friendliness – CNBC (2017)

Our workforce is growing – South Dakota is a net in-migration state and those businesses and workers expect a positive broadband experience.

Specific to the permit process that can frequently bog-down construction efforts, South Dakota takes a streamlined, efficient approach.

Environmental Permitting and Reviews

The South Dakota Department of Environment and Natural Resources (DENR) is a one-stop shop for state environmental permits. Environmental Protection Agency (EPA) has delegated most federal environmental permits in South Dakota to DENR, but not 404 Dredge and Spill permits. The 404 permits are still issued by the US Army Corps of Engineers, but to expedite 404 permitting, the Corps has a local office in Pierre, SD, phone 605-224-8531.

To help maintain a business-friendly climate, DENR has developed innovative environmental general permits that can be issued in a day or two. The General Permit for Storm Water Discharges Associated with Construction Activities is one such permit that may be applicable to broadband expansion. This is a general permit that covers three permitting requirements, all with a single application. It allows DENR to review one application and provide permit coverage for stormwater discharges, dewatering discharges, and temporary water rights, as described below.

General Permit for Storm Water Discharges Associated with Construction Activities

- Appropriate erosion and sediment control measures should be installed to control and reduce the discharge of sediment and other pollutants from construction sites that disturb one or more acres of land. To ensure an erosion and sediment control plan is in place, DENR can quickly provide coverage under South Dakota's General Permit for Storm Water Discharges Associated with Construction Activities. We ask that people submit the application for this general permit (called a "Notice of Intent") at least 15 calendar days before construction begins to ensure DENR's Surface Water Quality Program has time to process the application and prevent any delays in the project. There is an annual permit fee that ranges from $100 - $750 per year, based on the size of the project. DENR is working with the Bureau of Information and Telecommunications (BIT) to make the application and fee payment available online in the very near future, which will streamline things further for both DENR and the project owner. Contact DENR for additional information or guidance at 1-800-SDSTORM (1-800-737-8676) or stormwater@state.sd.us, or check out our webpage for more information: http://denr.sd.gov/des/sw/stormwater.aspx
- If groundwater is encountered during construction, it may be necessary to pump this water out of the trench and discharge the water. This would require both a discharge permit and a temporary water right from DENR. To streamline those permitting processes, DENR has included trench dewatering as part of the stormwater general permit for construction activities that is mentioned above.
- The application/notice of intent for the stormwater general permit also includes the necessary information to apply for a temporary water right. A temporary water right is

normally issued by DENR's Water Rights Program within a day or two of receiving the application.

Environmental Reviews

- DENR relies on permit applications to assess environmental aspects of construction projects, so no separate environmental review is required by the state.
- If federal agencies require an environmental review, DENR responds to any requests for information in 30 days or less.
- The most common comment to federal environmental reviews for construction projects is that measures need to be taken to ensure that South Dakota's surface water quality standards are protected and not violated. More information about the standards is on our webpage at https://denr.sd.gov/des/sw/swqstandards.aspx
- To help expedite the planning for construction projects and determine what may be encountered underground, DENR maintains on-line interactive Geographic Information Systems (GIS) maps and databases of all regulated storage tanks and spills of petroleum and other chemicals that have been reported to DENR at https://denr.sd.gov/datagis.aspx complete with available clean-up reports.
- If the construction activity encounters contaminated soils, the contamination must be reported to DENR at 605-773-3296, but DENR has processes in place to allow contaminated soils to be temporarily stockpiled and sampled to determine disposal requirements without delaying construction.

5. Public Safety

Broadband has long been utilized by public safety across the country. Landline connectivity in the agency offices, emergency managers, 9-1-1 Centers (called Public Safety Answering Points – PSAP's), hospitals, etc. have long been a critical part of their operations. Citizens have come to expect that first responders are communicating through interoperable systems built to specifications that they will come to their aid when needed.

Today, technology is revolutionizing emergency response, particularly using broadband by providing agencies with real-time information. From instant route information, situational awareness, real-time video, drones, voice communications, to the many sensors (Internet of Life Saving Things) becoming more prevalent in day-to-day operations as well as emergency response. High speed broadband (both wired and mobile/wireless) helps to deliver these technologies that are helping first responders deploy their resources more efficiently and safely in rapidly changing environments.

Improvements in mobile broadband and the move to 5G capabilities will allow for something called the Internet of Life-Saving Things. First responders across all disciplines may leverage information from a myriad of medical devices, sensors, cameras with artificial intelligence to provide better treatment to patients, unprecedented situational awareness to incident commanders, to means not yet invented. Some examples of these abilities include automatic crash notification systems (down to the number of people in the vehicle), turning off the power to a cut-line before it even hits the ground, wearables to monitor the health of a firefighter, real-time location of other officers, and gunshot detection to name a few.

The federal government's FirstNet authority is partnering with the private wireless sector to build and operate a wireless broadband network built specifically for public safety. FirstNet strives to offer mission-critical capabilities like priority and ruthless preemption for public safety. The system is intended to provide data connectivity and interoperable communications for police, fire and other first responder agencies across the U.S. Like any network ever built, coverage will grow better over time. In this case, FirstNet has established build-out timelines that must be met, or penalties will be assessed. As of 2019, South Dakota has not realized any of the promised build out for this network. The in-state assets are committed to be built within 5 years.

In 2023, the State of South Dakota State Radio system will be upgraded. Every tower across the state will require an upgrade of the old circuit switch to improved broadband capabilities. Some of

these towers are very remote sections of our state. South Dakota is the rare state in the country that has a significant majority of First Responders on a single radio communications system. All aspects of state government (Highway Patrol, Game Fish & Parks, Transportation, etc.), municipal government (police, sheriff, ambulance), federal government agencies and finally tribal governments. Over 20,000 devices made 27 million radio calls in 2018. It is a very comprehensive, ubiquitous system.

Governor Noem has demonstrated her commitment to the public safety community through an initial allocation of $4.6M towards the State Radio Upgrade project. The additional funds needed for the project will be identified in future legislative years.

Several major, broadband-based developments are leading to a paradigm shift in the role of the public safety answering point (PSAP). Most are already migrating from an environment that has been voice-centric for a half century to one that will be driven by data going forward. Next Generation 9-1-1 (NG9-1-1) technology will enable PSAPs to utilize broadband data in ways that will transform how the public reaches 9-1-1 and how public safety telecommunicators interact with first responders. Broadband assists these PSAP's in delivering efficient government services citizens expect to happen when they dial 9-1-1. Broadband allows PSAP's to effectively share data with neighbor PSAP's for emergency failover and would even technically allow for consolidation to work towards efficiency and quality of the service. Wireless broadband is also a critical part of the PSAP's as many of the NG9-1-1 technical solutions include wireless broadband as a backup for their operations. As our society and first responders become more and more mobile while working on wireless devices our 9-1-1 centers are increasingly and appropriately becoming emergency communications centers.

Broadband can greatly aid in improving the efficiency and reducing taxpayer costs with PSAP's. It has been demonstrated that ubiquitous broadband creates the opportunity for centralized PSAP services to increase the quality and efficiencies first responder needs.

The importance of broadband in the public safety sector can be summarized from an Emergency Manager 'what is the first thing you do when you arrive in a town that has just been leveled by a tornado?' 'We pull in and the first thing I do is establish an Internet connection – typically wireless – and start the laptop to bring up my tools and start making calls on my cell phone for whatever resources are needed.'

6. Federal Programs

The Federal Government has long played a key role in expanding broadband service availability across the country, both monetary and non-monetary. Providing broadband infrastructure loans and grants, incentivizing investment, subsidizing broadband in schools and libraries, and promoting digital literacy and broadband adoption are just a few of the ways the Federal government helps to close the country's broadband gap.

A few agencies have held more prominent positions in expanding broadband through their various offerings, including the Department of Agriculture (USDA) Rural Utilities Service (RUS), the Department of Commerce's National Telecommunications and Information Administration (NTIA), the Federal Communications Commission (FCC), and the United States Administrative Company (USAC). It is critical that the broadband industry understand the federal programs available. These opportunities present the ability to leverage private, state and federal funds to achieve sustainable broadband services.

The American Broadband Initiative - Over 20 Federal Agencies Involved
The American Broadband Initiative (ABI) is the Trump Administration's core effort at improving broadband service across the country. Announced in February 2019, over 20 Federal agencies are focusing on stimulating private investment in infrastructure to fill the broadband gap by removing hinderances, leveraging Federal assets, and maximizing Federal funding.

With streamlined Federal permitting, service providers have easier access to Federal assets and rights-of-way to expedite the deployment of broadband networks. Leveraging Federal assets such as towers, buildings, and land will lower the cost of broadband buildouts, and encourage private entities to expand broadband, especially in rural America. The ABI also seeks to maximize the impact of Federal funding to better target areas of need, improve consistency, and provide incentives for local policies that efficiently and effectively leverage Federal dollars.

USDA Rural Utilities Service
The Rural Utilities Service has arguably the longest history of promoting broadband expansion and adoption amongst Federal programs. RUS's foundation of funding service expansion has morphed over time to include more locations and recipients as technology improved and industry adoption flourished. All telecommunications networks financed under RUS are required to have the capacity to deliver broadband. Programs under RUS include the new ReConnect program, Telecom Loan Program, and the Farm Bill Broadband Loan Program.

ReConnect, announced in 2018, offers a combination of grants, loans, and loan/grant combinations to fund construction, maintenance improvement, and expansion of broadband service through loans, grants, or combinations thereof from a pool of $600M. The ReConnect program is technology-agnostic, only requiring networks built deliver speeds of at least 25/3 across their service area. Matching funds are required for grants, with varying levels of households to be funded not having broadband currently. ReConnect funds are available to states, local governments, territories, tribes, non-profits, corporations, and cooperatives.

Telecom Loan Program and Farm Bill Broadband Loan Program
These programs provide direct cost-of-money loans for construction, maintenance, improvement, and expansion of telephone and broadband service in rural areas. Over $3 billion dollars have been awarded through these programs since 2010. Networks built with these loans must deliver speeds of 25/3 as of 2019.

2018 Farm Bill
The 2018 Farm Bill included some additional changes and revisions that impact broadband. Under the 2018 bill, middle-mile broadband projects are now eligible for funding in broadband programs. The bill allows RUS to obligate, but not disperse, funds before the completion of the environmental review of the project, reducing the likelihood of funding opportunities being rushed or missed due to fiscal year timelines not aligning with program timelines. The bill establishes a rural

broadband working group comprised of numerous federal agencies is required to be established to identify, assess, and determine possible actions relating to barriers and opportunities for broadband deployment in rural areas. Finally, the USDA must consult with NTIA and FCC to assist with the verification of eligible service areas.

A Revised Broadband Availability Map

NTIA, authors of the original National Broadband Map funded by ARRA, is looking to re-establish the National Broadband Map. The target of this new map will be policymakers and stakeholders seeking to improve broadband deployment and adoption at the local, state, and federal level. To start this process, NTIA is partnering with eight states that have well-established state broadband programs and data collection efforts on how to improve the National Broadband Map. South Dakota will closely monitor these efforts to ensure the hard work of our providers is accurately represented and maximize the ability of providers to access Federal funds made available based on the data in this new national map.

Besides the National Broadband Map, NTIA previously administered the Broadband Technology Opportunities Program (BTOP), a $4B grant program focused at delivering middle-mile broadband infrastructure to community anchor institutions (CAIs) and long-haul fiber routes. South Dakota was the beneficiary of a BTOP grant awarded to SDN Communications, whereby ~$20M was awarded for the installation of over 300 miles of fiber serving hundreds of CAIs.

Universal Service Administrative Company

The Universal Service Administrative Company (USAC) was established in 1996 to collect, process, and distribute funds from fees collected on telecommunications services to provide support to providers to install and operate telecommunications service in high cost areas, areas of low income where telecommunications would not be affordable, for schools and libraries, and for rural health care. As an independent not-for-profit designated by the FCC, USAC administers and distributes the nearly $10 billion Universal Service Fund to companies that make universal service possible. Telecommunications providers receive financial support from this fund to provide service where it is not economically feasible to provide service (known as High Cost), or where the citizens could not otherwise afford services.

The Schools and Libraries Division (known as E-Rate) of USAC is an area South Dakota takes great advantage of. Schools and libraries can be reimbursed, at least in part, for broadband and technology expenses within their district or library. This extremely popular program has nearly $4B in funding through Universal Service Fees, but regularly sees two to three-times that much in requested support from the over 100,000 schools participating. South Dakota will continue with our consortium approach to E-Rate to operate the Digital Dakota Network and provide our best-of-breed K-12 education network statewide. South Dakota expands the impact of E-Rate and other USAC programs by establishing K-12 schools as an anchor-tenant. This allows the surrounding households and businesses to benefit from the new services, technology, and economies-of-scale seen after implementing advanced services under longer-term contracts.

Connect America Fund

The Connect America Fund (CAF), announced in 2011, seeks to expand broadband by directly funding broadband deployment with providers as a modern spin on programs such as the High Cost Fund under USAC. CAF dollars must implement broadband-capable technologies such as fiber-optics and fixed wireless instead of telephone or other services. Connect America Fund projects currently only requires speeds 10/1 speed definition, which no longer meets the Federal definition of broadband.

Phase I of the CAF program involved funding broadband expansion in the largest providers, known as Price Cap Carriers. South Dakota has one price cap carrier, CenturyLink, which was awarded up to $54.6M in funding within South Dakota, with their progress seen here: https://www.fcc.gov/reports-research/maps/connect-america-fund-caf-phase-i/ The most recent efforts, known as Phase II, involve reverse auctions with providers bidding on projects to receive Federal financial support to deploy broadband in specific, targeted areas. 103 bidders won nearly

$1.5B over ten years to provide services to over 700,000 locations in 45 states. CAF funded projects are held to rigid timelines.

An additional $67M in CAF money was made available to 207 rural carriers in February 2019 in addition to the funds already obligated or dispersed. Any provider seeking these funds will need to significantly expand broadband service in their territory and build to the 25/3 standard. A map identifying CAF investments is available here:
https://data.usac.org/publicreports/caf-map/

Mobility Fund and Remote Area Fund
The FCC is also working on establishing and launching a $4.53B Mobility Fund Phase II reverse auction to expand 4G LTE wireless coverage in rural America. Another upcoming fund will be the Remote Area Fund, which is specifically targeted at finding service providers to deploy broadband in areas previously not bid on in other funding auction opportunities. South Dakota is monitoring these funds for potential benefits in the state and will support providers as necessary to ensure our citizens receive the maximum possible benefit from these Federal opportunities.