NEBRASKA

Rural Broadband Task Force

Findings and Recommendations

October 2021

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Executive Summary

The Rural Broadband Task Force was created to "review issues relating to availability, adoption, and affordability of broadband services in rural areas of Nebraska" by LB 994, which was passed by the Legislature and signed by Governor Ricketts on April 17, 2018. The bill was introduced by Senator Curt Friesen, Chair of the Transportation and Telecommunications Committee. The task force is chaired by Ed Toner, CIO for the State of Nebraska and Chair of the Nebraska Information Technology Commission. This is the second report presenting the task force's findings and recommendations as required by LB 994.

Progress Since the 2019 Report

Considerable progress has been made in implementing many of the recommendations in the task force's 2019 report. The following list highlights the progress made:

- $29.5 million in grants was awarded to 60 projects bringing broadband to 17,600 households through the Remote Access Rural Broadband Grant Program. The grant program was funded by the CARES Act and administered by the Nebraska Department of Economic Development.
- LB 388 which was enacted in 2021 created the Broadband Bridge Grant Program. $20 million a year for two years was appropriated for the program. The deadline for the first round of applications is Oct. 1, 2021.
- Broadband projects funded through the Nebraska Universal Service Fund have connected 19,583 households since 2019.
- Remittances to the Nebraska Universal Service Fund increased from $32.8 million in 2018 to $46.8 million in 2020 due to reforms to the residential contribution method.
- The Public Service Commission is taking steps to initiate a reverse auction of $3 million in NUSF support.
- LB 338 improved the accountability of the Nebraska Universal Service Fund by specifying build out requirements of 100 Mbps down and 100 Mbps up and by requiring recipients to conduct and submit speed tests.
- The Nebraska Public Service Commission established the E-Rate Special Construction Matching Program in 2020, providing matching funding for 6 public libraries and one public school in the first year of the program.
- Governor Ricketts, the Nebraska Department of Education, Educational Service Units, and local school districts coordinated federal funding to purchase computing devices, hot spots, and internet-enabled devices as well as implement connectivity projects.
- LB 992, enacted in 2020, established a process to use private utility easements for communications and made the process of leasing dark fiber less burdensome.

Findings and Recommendations

Broadband Data and Mapping

Current state and federal broadband mapping efforts likely overstate broadband coverage and need to be improved. In 2019, the task force recommended waiting for the FCC to improve its broadband data collection. The State of Nebraska can no longer wait for the FCC to provide more accurate broadband availability data and mapping.

Key Recommendation

- Initiate a program to map broadband availability for serviceable locations in the state augmented by speed test data.

Alternative Technologies and Providers

Several emerging technologies may be well-suited for rural areas. Fixed wireless technologies using mid-band spectrums could potentially provide service of 100 Mbps or greater in rural areas. SpaceX (Starlink) is the first company to provide broadband service via low Earth orbit satellites and is now offering its beta service to users at some locations in Nebraska. TV white space has received significant attention. However, it may be better suited for lower bandwidth or non-line-of-sight applications.

Nebraska Universal Service Fund and Reverse Auction

The Nebraska Universal Service Fund (NUSF) provides support to price cap, rate of return, and mobile wireless carriers in Nebraska. A total of $36,545,562 is available for broadband projects in high cost areas through the NUSF in 2021. Since 2019, 19,583 households have been connected through broadband projects funded through the Nebraska Universal Fund.

The total remittances to the NUSF have increased from approximately $32.8 million in 2018 to $46.8 million in 2020. The increase is due to the Nebraska Public Service Commission's actions to reform the contribution methodology for residential services. Further changes to the contribution mechanism for business services is projected to increase the size of the fund to approximately $52 to $55 million. Even with steps to stabilize the fund, however, the size of the fund is not sufficient to provide support for fiber deployment to all Nebraska residences and businesses.

The Nebraska Public Service Commission is establishing rules and procedures for a reverse auction and is expected to move through the process of redirecting $3 million of support in 2022.

Key Recommendations

- Evaluate the results of the Nebraska Public Service Commission's expected reverse auction of NUSF support.
- Coordinate the distribution of NUSF support with other funding sources to avoid duplication of funding and to target funding to areas most in need of support.
- As funding from multiple sources is being utilized for broadband deployment projects, state and federal policymakers will need to develop mechanisms to ensure that broadband networks are being supported.

Public-Private Partnerships and Broadband Planning

Grant programs such as the Remote Access Rural Broadband Grant Program and the Nebraska Broadband Bridge program which provide funding for broadband deployment projects in unserved and underserved areas are essentially a form of public-private partnerships. Governor Ricketts and the Legislature are expected to allocate any additional federal funding for broadband deployment projects in 2022.

Key Recommendations

- Express appreciation to Governor Ricketts and the Legislature for recognizing the importance of broadband to Nebraska and for providing funding for broadband through the Nebraska Broadband Bridge grant program and the Remote Access Rural Broadband Grant program.
- Review the initial round of awards from the Broadband Bridge Grant Program to determine the impact of the program.
- Encourage local and regional broadband planning.

Agriculture

Farmers and ranchers need upload speeds of at least 30 Mbps to transfer large amounts of generated data to the cloud. In the future, even greater upload speeds may be required. Rural areas of most Nebraska counties—including many of Nebraska's top-producing agricultural counties—lack broadband with upload speeds of greater than 25 Mbps or fiber connectivity.

Different methods of connectivity are required for agriculture, including:

- Low-bandwidth connectivity for devices like sensors or monitors often called internet of things (IoT) devices
- High speed, centralized broadband with upload speeds of at least 30 Mbps up for targeted agricultural operational headquarters such as a farm or ranch operations center
- High-speed decentralized coverage over large agricultural areas

Key Recommendations

- Establish a state goal of having broadband access to every farm or ranch headquarters.
- Focus a portion of broadband funding on the highest cost areas.
- Review the initial round of awards from the Broadband Bridge Grant Program to determine if adjustments to program requirements could aid in funding extremely high cost rural areas.

Digital Inclusion, Homework Gap and Leveraging E-Rate Funding

Those without broadband connectivity at home struggled to learn, access health care and work remotely during the COVID-19 pandemic. Approximately 12% of Nebraskans or 215,000 individuals do not have a broadband subscription at home. This includes 32,000 Nebraskans under 18 years old.

Governor Ricketts, the Nebraska Department of Education, Educational Service Units, and local school districts coordinated federal funding to close the connectivity gap for students by purchasing computing devices, hot spots, and internet-enabled devices. Federal funding also helped some libraries improve their broadband connections and start/expand hotspot lending programs.

Libraries are key community partners in providing internet and computer access to students and the general public—especially in rural areas, but just over half of Nebraska libraries serving communities with populations of less than 2,500 have internet access below 25 Mbps down and 3 Mbps up.

Increased support for low-income households is currently being provided through the FCC Emergency Broadband Benefit Program.

Key Recommendations

- Encourage public libraries and schools without fiber connections to apply for support for new fiber construction from the E-Rate Special Construction matching fund.
- Encourage school districts, ESUs, public libraries, and communities to implement programs such as Wi-Fi on buses, hotspot lending programs, low cost pay-by-the-month internet access, or alternative wireless deployments for student access on school-issued devices in order to reduce the number of unserved and underserved students.
- Encourage communities and regions to develop digital inclusion plans to address multi-generational needs.

Broadband Technician Workforce

Nebraska, like the rest of the country, currently faces a shortfall of skilled workers needed to deploy broadband. Additional investments in broadband will likely increase the demand for skilled workers.

Key Recommendation

- The telecommunications industry, the state's community colleges, local school districts, and economic development and workforce development agencies should engage in conversations about recruitment of technicians as well as developing training and apprenticeship programs.

Key Definitions and Acronyms

Broadband—High-speed internet access. The FCC currently defines broadband services as 25 Mbps down and 3 Mbps up or greater. However, many programs are defining broadband as 100 Mbps down and 20-100 Mbps up or greater.

Census Block—Census blocks are statistical areas that can be as small as 1/1,000 of a square mile up to 200 square miles.

Connect America Fund (CAF)—The FCC's universal service high cost program which provides support to carriers for broadband.

Competitive Local Exchange Carrier (CLEC)—A telecommunications provider competing with the incumbent local exchange carrier (ILEC).

Fixed Broadband—Any broadband transmission method to a home or business including Digital Subscriber Line (DSL), cable modem, fiber, fixed wireless, and satellite. Fixed broadband does not include mobile (cellular) broadband.

Fixed Terrestrial Broadband—Any broadband transmission method to a home or business including Digital Subscriber Line (DSL), cable modem, fiber, and fixed wireless. Fixed terrestrial broadband does not include mobile (cellular) broadband and satellite.

Form 477—Providers of fixed broadband (which includes providers of services via DSL, coaxial cable, fiber optic cable, fixed wireless, and satellite) report the type of technology, maximum advertised speeds in Mbps up and down, and whether the service is residential, business, or both by census block to the FCC using Form 477.

Incumbent Local Exchange Carrier (ILEC)—A local telephone company which provided landline service before the market was opened to competitive local exchange carriers.

Price Cap Carriers–Include the three largest incumbent exchange carriers in the state: CenturyLink (also known as Lumen Technologies), Frontier (also known as Citizens Telecommunications of Nebraska), and Windstream.

Rate of Return Carriers—Smaller, rural incumbent local exchange carriers.

Rural Area—Open countryside with population densities less than 500 people per square mile or places with fewer than 2,500 people.

Rural Digital Opportunity Fund (RD0F)—The FCC's reverse auction of universal service support. The first phase ended on November 25, 2020.

Serviceable Location—Locations where fixed broadband service can be installed.

Terrestrial Broadband—Land-based methods of broadband transmission (DSL, cable modem, fiber, fixed wireless and mobile wireless). Terrestrial broadband does not include satellite.

Unserved Areas—The Rural Broadband Task Force defines unserved areas as areas with internet service at less than 25 Mbps down/3 Mbps up.

Underserved Areas—The Rural Broadband Task Force defines underserved areas as areas which have internet service at 25 Mbps down/3 Mbps up or greater but less than 100 Mbps down/20 Mbps up.

Introduction

Broadband and telecommunications service in rural areas of the state should be comparable in download and upload speed and price to urban areas.

-Vision of the Rural Broadband Task Force, adopted September 24, 2018

The Rural Broadband Task Force was created to "review issues relating to availability, adoption, and affordability of broadband services in rural areas of Nebraska" by LB 994, which was passed by the Legislature and signed by Governor Ricketts on April 17, 2018. The bill was introduced by Senator Curt Friesen, chair of the Transportation and Telecommunications Committee. The task force is chaired by Ed Toner, CIO for the State of Nebraska and Chair of the Nebraska Information Technology Commission. This is task force's second report presenting its findings and recommendations as required by LB 994.

Importance of Broadband

The COVID-19 pandemic underscored the importance of broadband to the state's businesses, consumers, agricultural producers, students, educators, patients and health care providers. Households with broadband connections at home were better able to learn, access health care, and work remotely during the pandemic.

Rural broadband also impacts Nebraska's economy and rural communities. Rural broadband availability and adoption are associated with:

- Attraction and retention of millennials
- Greater economic growth
- Attraction of new firms
- Higher household incomes
- Small business growth[i]

Next generation precision agriculture technologies which require connectivity can reduce costs for farmers and ranchers and yield more revenue. Here are three examples of the potential economic impact of connected agricultural technologies:

- Microclimate monitoring through satellites or on-site weather stations can reduce crop loss by up to 80%.
- Drone imagery or monitors in the field can collect nutritional and growth data used to calculate optimal inputs, saving $12 per acre on corn farms.
- Ranchers using online cattle auctions can receive 65% more revenue per unit of beef.[ii]

Definitions and Prioritization

In order to clarify terms and prioritize those areas most in need of assistance, the task force adopted the following definitions and priorities:
Rural areas are defined as open countryside with population densities less than 500 people per square mile or places with fewer than 2,500 people.

Unserved areas are defined as areas with internet service at less than 25 Mbps down/3 Mbps up.

Underserved areas are areas which have internet service at 25 Mbps down/3 Mbps up or greater but less than 100 Mbps down/20 Mbps up.

The task force recommends that policies and available funding target areas based on the following prioritization:

1. Unserved Areas Outside City/Town/Village Limits
2. Unserved Areas Within City/Town/Village Limits
3. Underserved Areas Outside City/Town/Village Limits
4. Underserved Areas Within City/Town/Village Limits

The task force's definition of rural recognizes that some efforts—particularly those involving public-private partnerships and digital inclusion—may require the participation of both small communities and surrounding areas outside municipal boundaries. The definition also recognizes that some small communities may be unserved or underserved.

The Nebraska Public Service Commission allocates high cost funding from the Nebraska Universal Service Fund using a more specific definition of rural. The Nebraska Public Service Commission defines rural areas as rural areas which meet the following criteria:

- Census blocks that contain fewer than 20 households with a density below 42 households per square mile
- Census blocks not classified as a city or village per census
- Census blocks not within census-designated city limits

The use of this definition to distribute NUSF fund is consistent with the task force's prioritization.

Photo Credit: Tim Vrtiska Creative Commons License CC BY 2.0

Progress on 2019 Task Force Recommendations

Considerable progress has been made in implementing many of the recommendations in the task force's 2019 report, including the following accomplishments:

$29.5 million in grants was awarded to 60 projects bringing broadband to 17,600 households through the Remote Access Rural Broadband Grant Program. The grant program was funded by the CARES Act and administered by the Nebraska Department of Economic Development.

LB 388 which was passed by the Legislature and signed by Governor Ricketts on May 26, 2021 created the Broadband Bridge Grant Program. $20 million a year for two years was appropriated for the program. The deadline for the first round of applications is October 1, 2021.

Since 2019, 19,583 households have been connected through broadband projects funded through the Nebraska Universal Fund.

LB 338 improved the accountability of the Nebraska Universal Service Fund by specifying build out requirements of 100 Mbps down and 100 Mbps up and by requiring recipients to conduct and submit speed tests.

Reforms to the NUSF contribution method for residential services increased remittances from $32.8 million in 2018 to $46.8 million in 2020. On May 11, 2021, the Nebraska Public Service Commission approved an order reforming the NUSF contribution method for business services to a per connection surcharge of $1.75 effective January 1, 2022.

The Public Service Commission is taking steps to initiate a reverse auction of $3 million in NUSF support allocated to Frontier.

The Nebraska Public Service Commission established the E-Rate Special Construction Matching Program in 2020. Public libraries in Bancroft, Bayard, Beatrice, Clay Center, Verdigre, and Wymore and the Southwest Public Schools' Elementary School at Indianola were successful in getting fiber for the first time in 2021 through the program.

Governor Ricketts, the Nebraska Department of Education, Educational Service Units, and local school districts coordinated federal funding to purchase computing devices, hot spots, and internet-enabled devices as well as implement connectivity projects.

LB 992 made the process of leasing dark fiber less burdensome. LB 992 also specified that leases of dark fiber to provide broadband in unserved areas do not need to contribute a portion of the proceeds to the Nebraska Universal Service Fund. LB 992 was passed by the Legislature and signed by Governor Ricketts on August 15, 2020.

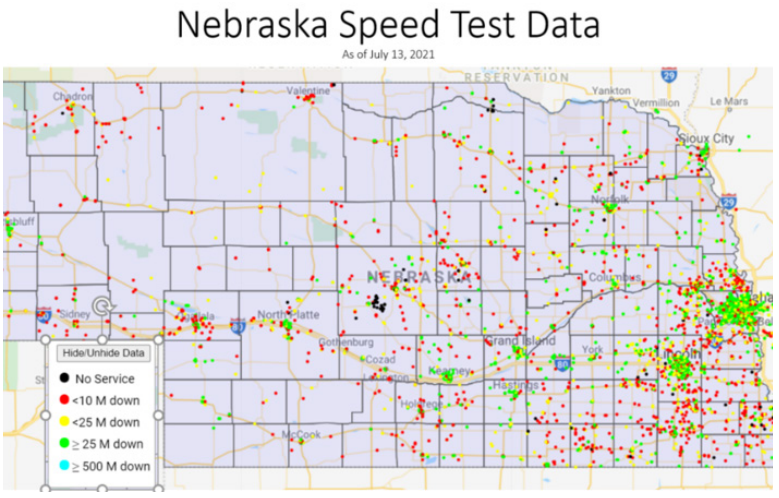
LB 992 established a process to use private utility easements for communications.

A complete list of task force recommendations and the progress made is available in Progress on 2019 Recommendations in the Appendix.

Photo Credit Anne Byers

Form 477 Data Likely Overstates Availability

Form 477 data collected by the FCC likely overstates broadband availability because providers report availability by census block. If they serve or can readily provide service to one customer in the census block, the entire census block is reported as having broadband available. Census blocks are statistical areas that can be as small as 1/1,000 of a square mile up to 200 square miles. Census blocks which are greater than two square miles cover about 50% of Nebraska geographically.



The FCC is in the process of improving broadband data collection efforts, but it will likely be months or perhaps a year or more before the new process is in place and data is available. Additional data such as speed tests, checks with providers on broadband availability by address, or information collected from challenge processes can be used to supplement information on broadband availability. A screen shot from the Nebraska Regional Officials Council's Nebraska Speed Test project is shown above.

To what degree does Form 477 data overestimate broadband availability?

Two studies provide some insights:

- USTelecom conducted a pilot broadband mapping project in Missouri and Virginia in 2019. The pilot found that 38% of total rural locations in census blocks reported as served by Form 477 data were actually unserved.
- BroadbandNow estimated that 85.3% of Nebraskans had broadband available compared to the FCC's estimate of 95.6%.
- BroadbandNow also found that overreporting varied by technology with fixed wireless being the technology most likely to be overreported. See the table below. With the huge increase in fixed wireless broadband availability in Nebraska, fixed wireless overreporting is likely a significant contributor to overreported coverage in Nebraska.

Technology	% Over-reported
Cable	17%
DSL	18%
Fiber	23%
Fixed Wireless	35%

Broadband Availability in Nebraska

Determine how Nebraska rural areas compare to neighboring states and the rest of the nation in average download and upload speeds and in subscription rates to higher speed tiers, when available.

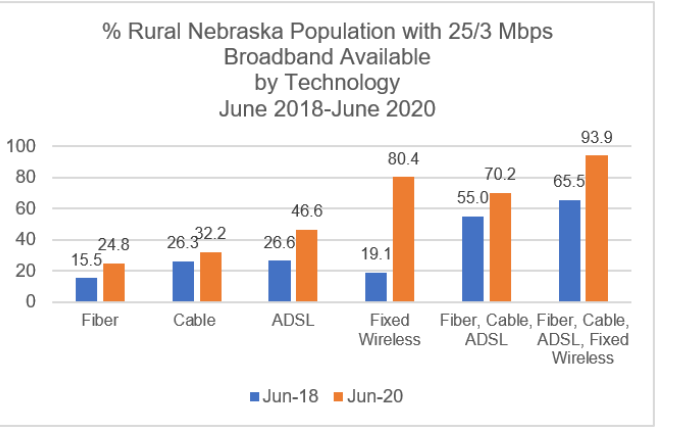
–Nebraska Revised Statutes 86-1102(3)(a)

Findings

Fiber deployment and broadband availability increased in rural Nebraska. Data from the FCC's Form 477 data indicates that fiber deployment and broadband availability at both 25 Mbps down/3 Mbps up and 100 Mbps down/10 Mbps up increased in rural Nebraska. The Task Force recognizes that this data likely overstates availability because providers report broadband availability by census blocks which can be up to 200 square miles.

- According to the FCC's Form 477 data, 93.9% of rural Nebraskans have broadband at 25 Mbps down and 3 Mbps up available as of June 2020, up from 65.5% in June 2018.
- 68.2% of rural Nebraskans have broadband at 100 Mbps down and 10 Mbps up available, up from 34.8% in June 2018.
- 24.8% of rural Nebraskans have fiber broadband available at 25/3 Mbps available, up from 15.5% in June 2018.
- The availability of fixed wireless broadband at 25/3 Mbps in rural Nebraska dramatically increased from 19.1% in June 2018 to 80.4% in June 2020.
- The availability of ADSL and cable broadband at 25/3 Mbps in rural Nebraska also increased.

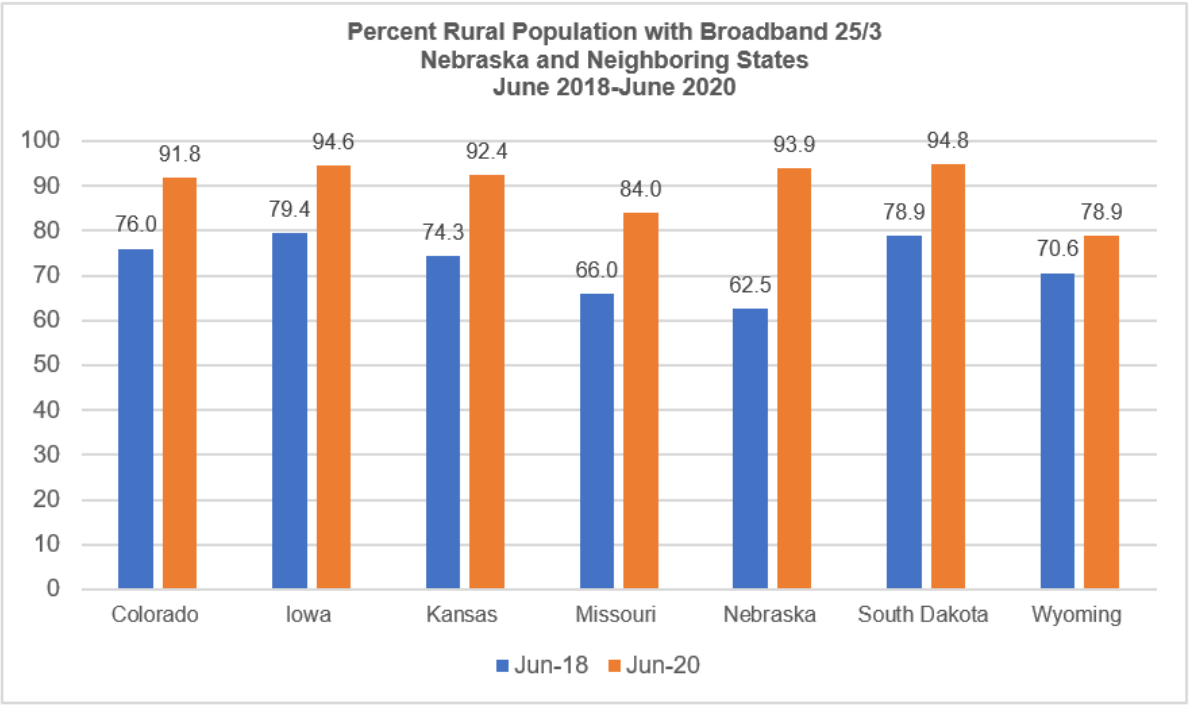
The chart below shows broadband availability in rural Nebraska by technology.



Key Findings

- Fiber deployment and broadband availability at both 25 Mbps down/3 Mbps up and 100 Mbps down/10 Mbps up in rural Nebraska increased.
- The Task Force recognizes that FCC Form 477 data likely overstates availability.

Nebraska's ranking for rural broadband availability among neighboring states improved from 7th to 3rd with Nebraska slightly behind South Dakota and Iowa. Nebraska appeared to show the greatest increase (+31.4%) in broadband availability compared to all neighboring states. See the chart below.



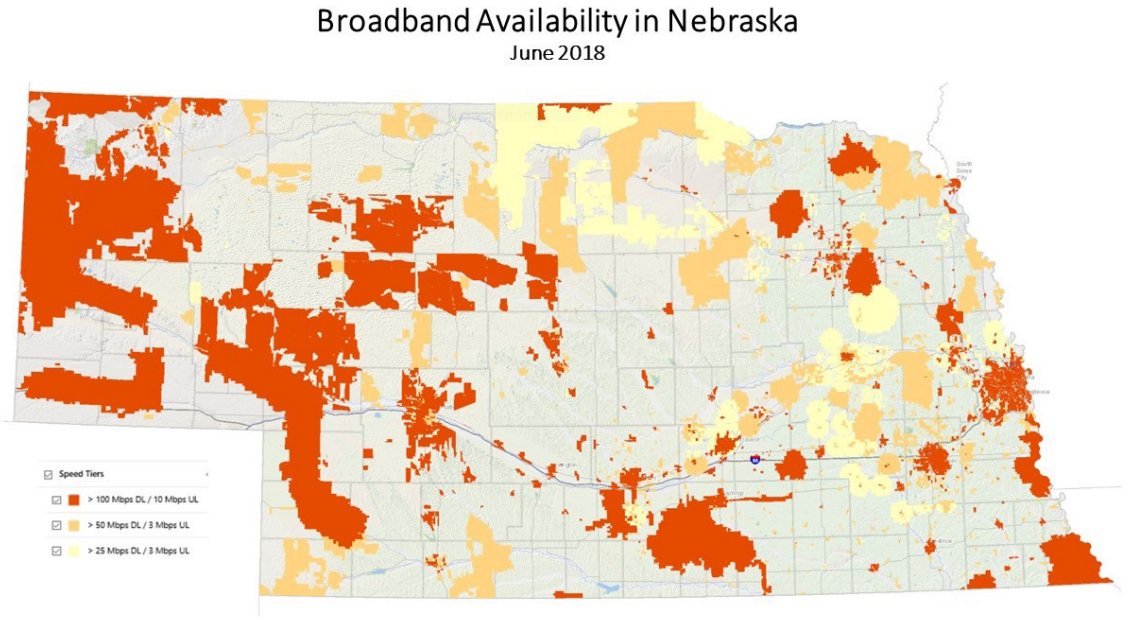
Broadband availability varies by county. Ten Nebraska counties have broadband available to 75% or less of their population. See the table below.

Percent Population with 25/3 Broadband Available
Bottom 10 Nebraska Counties
June 2020

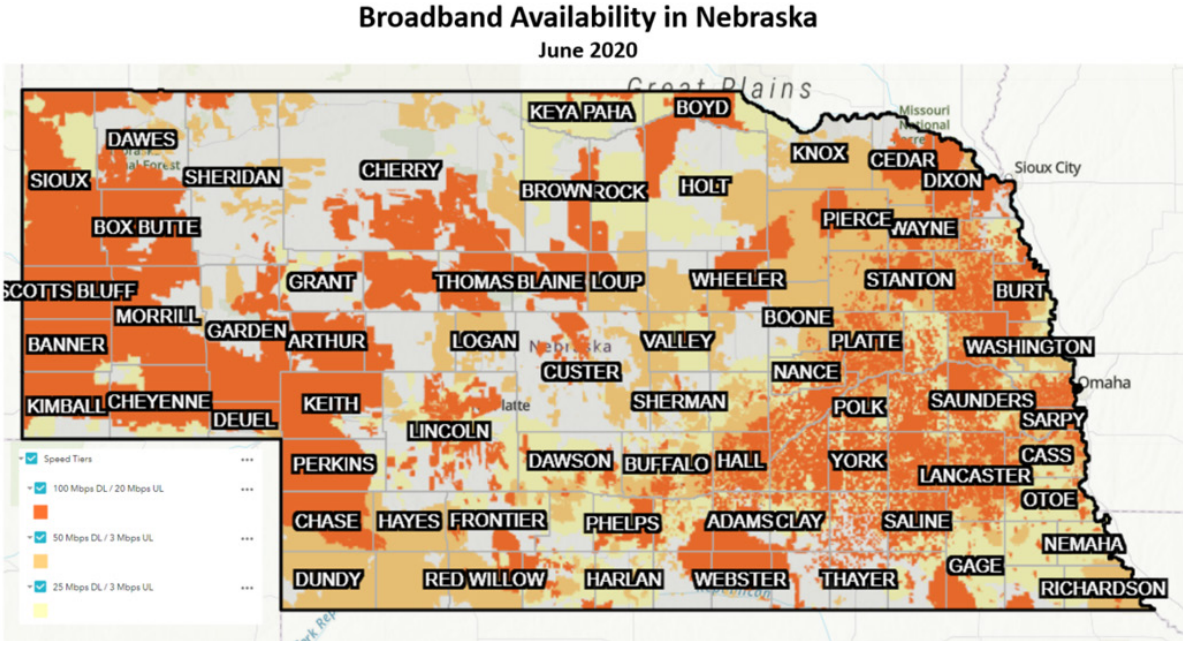
Area	Entire County	Rural Areas
Custer County, NE	75.3	64.7
Thayer County, NE	71.6	71.6
Grant County, NE	69.3	69.3
Cherry County, NE	62.6	47.4
Webster County, NE	58.3	58.3
Greeley County, NE	56.4	56.4
Sheridan County, NE	52.1	52.1
McPherson County, NE	51.8	51.8
Brown County, NE	28.2	28.2
Logan County, NE	27.8	27.8

Broadband is available to approximately 94% of the population in tribal areas. The tribal population in Knox County is the only notable exception with 52% of the tribal population having broadband available.

The maps below show improvements in the availability of broadband of at least 25 Mbps down and 3 Mbps up in Nebraska from June 2018 to June 2020.



Nebraska Broadband Map using June 2018 FCC Form 477 data, broadbandmap.nebraska.gov



Nebraska Broadband Map using June 2020 data from broadbandmap.nebraska.gov

Nebraska leads most neighboring states and the U.S. in the adoption of broadband at higher speed tiers. Approximately 52% of Nebraska households subscribe to broadband service of 100 Mbps down and 10 Mbps up or greater. Nebraska ranks first among its neighboring states in the adoption of broadband at 250 Mbps down and 25 Mbps up or greater, with approximately 15% of Nebraska households subscribing to this speed tier.

Adoption Rate for Fixed Terrestrial Services
December. 2019

Adoption Rate for Fixed Terrestrial Services Dec. 2019			
Area	**At Least 25/3 Mbps**	**At Least 100/10 Mbps**	**At least 250/25 Mbps**
Colorado	73.2%	36.1%	7.7%
Iowa	54.1%	31.0%	4.9%
Kansas	58.6%	46.1%	14.7%
Missouri	57.1%	50.0%	9.7%
Nebraska	62.2%	52.1%	14.9%
South Dakota	70.4%	56.9%	4.6%
Wyoming	63.1%	49.6%	0.5%
United States	68.9%	50.4%	9.0%

FCC 2020 Communications Marketplace Report https://docs.fcc.gov/public/attachments/FCC-20-188A1.pdf

Nebraska ranks 34th in fixed broadband and 47th in mobile broadband speed test results. See the following tables.

Ookla Fixed
Median Download and Upload Speeds

July 2021

Area	Down (Mbps)	Up (Mbps)
Colorado (19th)	114.0	12.8
Iowa (41st)	87.4	19.7
Kansas (28th)	103.5	19.3
Missouri (30th)	101.4	16.0
Nebraska (34th)	98.9	15.5
South Dakota (43rd)	84.8	16.7
Wyoming (51st)	50.8	10.6

Ookla United States Fixed Broadband Internet Speed Tests July 2021

Ookla Mobile
Median Download and Upload Speeds

July 2021

Area	Down (Mbps)	Up (Mbps)
Colorado (27th)	40.7	6.9
Iowa (44th)	33.2	7.4
Kansas (23rd)	42.1	7.3
Missouri (17th)	44.1	6.4
Nebraska (47th)	31.1	7.7
South Dakota (22nd)	42.2	8.2
Wyoming (50th)	27.5	5.3

Ookla United States Mobile Internet Speed Tests July 2021

Broadband Metrics

Fixed Broadband Availability		
Measure	**2019 Most Recent Data** **25 Mbps down/3 Mbps up** **June 2018, FCC Form 477**	**2021 Most Recent Data** **25 Mbps down/3 Mbps up** **June 2020, FCC Form 477**
The percent of Nebraskans with access to fixed broadband	89%	98%
The percent of **rural** Nebraskans with access to fixed broadband	63%	94%
How Nebraska compares with neighboring on fixed broadband availability	6th out of 7	2nd out of 7 (state) 3rd out of 7 (rural)
How Nebraska compares with the U.S. on fixed broadband availability	Nebraska lags the U.S. 94% of Americans and 76% of rural Americans have access to fixed broadband.	Nebraska beats the U.S. 96% of Americans and 85% of rural Americans have access to fixed broadband.

Fiber Broadband Availability*		
Measure	**2019 Most Recent Data** **25 Mbps down/3 Mbps up** **June 2018, FCC Form 477**	**2021 Most Recent Data** **25 Mbps down/3 Mbps up** **June 2020, FCC Form 477**
The percent of Nebraskans with access to fiber broadband (25/3 Mbps)	23.9%	45.8%
The percent of rural Nebraskans with access to fiber broadband (25/3 Mbps)	14.4%	24.8%
How Nebraska compares with neighboring states on fiber broadband (25/3 Mbps) availability	5th out of 7 (state) 5th out of 7(rural)	3rd out of 7 (state) 5th out of 7(rural)
How Nebraska compares with the U.S. on fiber broadband (25/3 Mbps) availability	Nebraska lags the U.S. 30.8%% of Americans and 15.8% of rural Americans have access to fiber broadband (25/3 Mbps).	Nebraska beats the U.S. 43.7% of Americans and 23.7% of rural Americans have access to fiber broadband (25/3 Mbps).

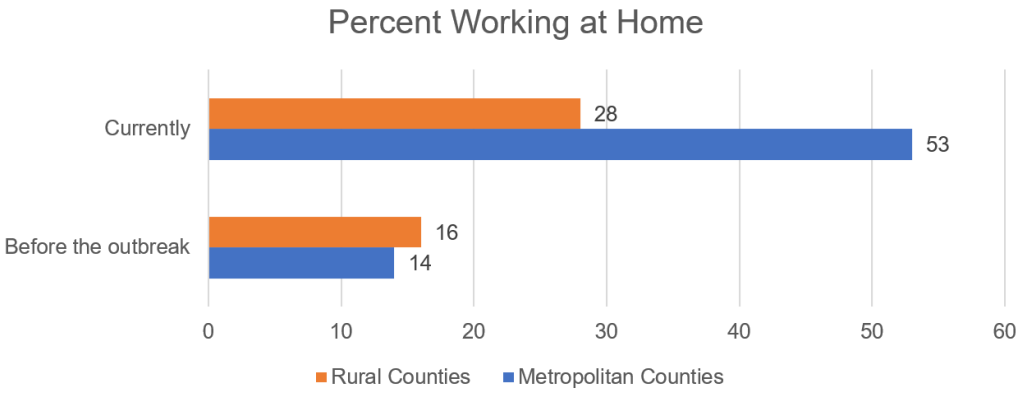
*New Metric for 2021

Mobile Broadband Availability		
Measure	**2019 Most Recent Data** **25 Mbps down/3 Mbps up** **June 2018, FCC Form 477**	**2021 Most Recent Data** **25 Mbps down/3 Mbps up** **June 2020, FCC Form 477**
The percent of Nebraskans with access to mobile broadband	83%	96.9%
The percent of rural Nebraskans with access to mobile broadband	56%	93.3%
How Nebraska compares with neighboring on mobile broadband availability	6th out of 7	3rd out of 7
How Nebraska compares with the U.S. on mobile broadband availability	↓ Nebraska lags the U.S. 89% of Americans and 69% of rural Americans have access to broadband.	↓ Nebraska lags the U.S. with 97.4% of Americans having mobile broadband available. ↑ Nebraska beats the U.S. in rural mobile broadband availability with 90.8% of rural Americans having mobile broadband available.

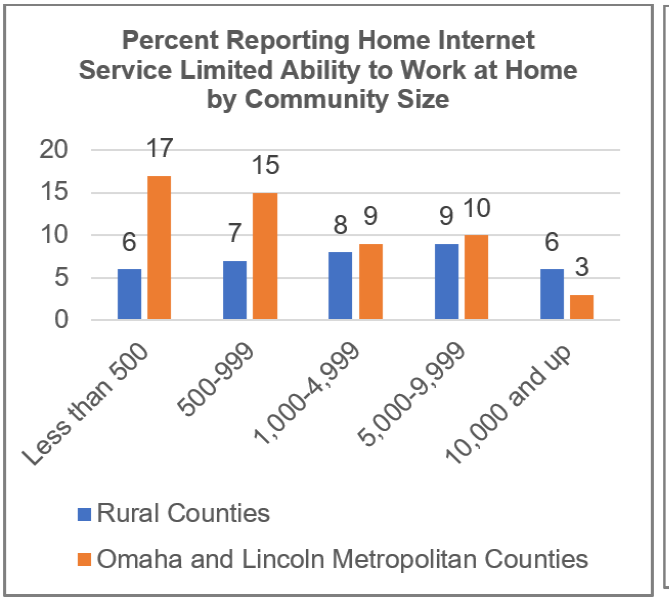
Pandemic Increases Working at Home

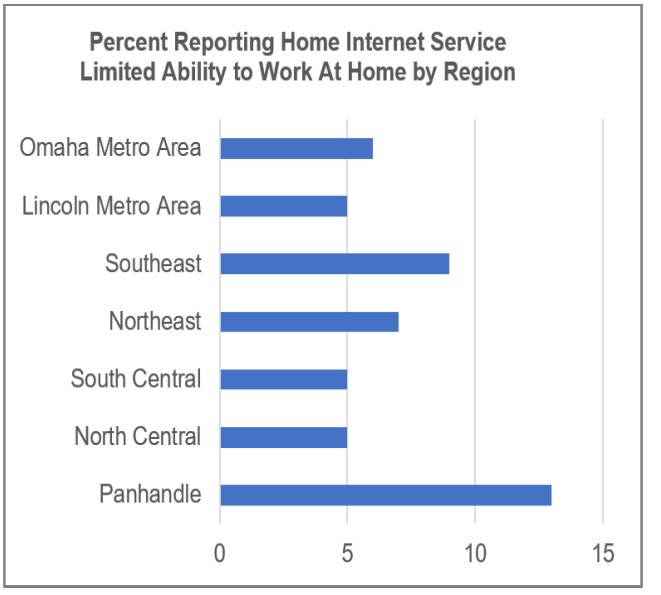
Small Town Residents Outside Omaha and Lincoln and Panhandle Residents Most Likely to Report Home Internet Service Limited Their Ability to Work at Home

Before the pandemic outbreak rural Nebraskans were slightly more likely than metropolitan residents to work at home with 16% of rural residents and 14% of metropolitan residents reporting working at home according to the 2021 Nebraska Metro and Rural Polls. During the spring of 2021, nearly twice as many metropolitan respondents (53% metropolitan residents v. 28% rural residents) reported working at home.



Seven percent of rural residents and five percent of metropolitan residents with home internet service reported that their internet service limited their ability to work at home. Panhandle residents (13%) and metropolitan residents living in very small communities (15%-17%) were the most likely to report that their home internet limited their ability to work at home.





Broadband Data and Mapping

Determine other issues that may be pertinent to the purpose of the task force.

–Nebraska Revised Statutes 86-1102(3)(g)

Findings

Current state and federal broadband mapping efforts likely overstate broadband coverage and need to be improved. In 2019, the task force recommended waiting for the FCC to improve its broadband data collection. The State of Nebraska can no longer wait for the FCC to provide more accurate broadband availability data and mapping.

- Nebraska's broadband map currently utilizes Form 477 data released by the FCC. Providers of fixed broadband (which includes providers of services via DSL, coaxial cable, fiber optic cable, fixed wireless, and satellite) report the type of technology, maximum advertised speeds in Mbps up and down, and whether the service is residential, business, or both by census block to the FCC. Providers must report every census block where service is provided or could be provided within a reasonable amount of time without an extraordinary commitment of resources.
- The use of census block reporting can overstate broadband availability in large census blocks. Census blocks are statistical areas that can be as small as 1/1,000 of a square mile up to 200 square miles. Census blocks which are greater than two square miles cover about 50% of Nebraska geographically.
- The FCC collects the data twice per year (March 1 for broadband availability as of Dec. 30 and September 1 for broadband availability as of June 30). There is no set schedule for data releases, but data is usually released a year or more after the reporting date.
- The FCC and Congress have taken steps to improve broadband data collection. The new method of collection will require carriers to provide broadband availability at the address level. However, the FCC has not yet begun collecting broadband deployment data from all providers. It is not known when the FCC will implement the new data collection method or when the data will be made available.
- The FCC has launched a demo of a new mobile wireless map with coverage information from AT&T, T-Mobile, U.S. Cellular and Verizon which implements the increased cell edge probability and cell loading factors specified in the Broadband Data Act passed in March 2020.
- Supplementing data from providers with speed test data or other sources of data such as the challenge process required by the Nebraska Broadband Bridge Program can help verify data submitted by providers. The Nebraska Regional Officials Council, UNK Rural Measures Project and the FCC have established speed test programs. Additionally, broadband providers receiving support from the NUSF or grants from the Nebraska Broadband Bridge Program are required to conduct and submit speed tests to the Nebraska Public Service Commission.
- Broadband providers are more willing to provide coverage availability data to the State given the attention that broadband availability is receiving and the availability of grant funding through the Nebraska Broadband Bridge Grant Program.
- With an influx in federal funding expected for broadband deployment, the State of Nebraska needs more accurate maps of broadband availability to identify areas that lack broadband, develop plans, and to award available broadband funding to unserved and underserved areas.

Key Recommendation

- **Initiate a program to map broadband availability for serviceable locations in the state augmented by speed test data.**

Recommendations

Industry conference discussing state of broadband buildout in Nebraska. Photo Credit Mary Ridder.

- Initiate a program to map broadband availability for serviceable locations in the state augmented by speed test data.
- To the extent possible, encourage the FCC and/or Congress to continue to improve more accurate data collection of mobile wireless coverage data.
- Urge the FCC to accelerate the implementation of the Digital Opportunity Data Collection program to improve the accuracy of the broadband availability collected. Once the improved data is available, the State of Nebraska may be able to leverage this data.
- The Nebraska Information Technology Commission, Nebraska Public Service Commission and other stakeholders should explore strategies to encourage Nebraskans to participate in speed testing efforts developed to enhance federal and state broadband mapping.

Alternative Technologies and Providers

Review the feasibility of alternative technologies and providers in accelerating access to faster and more reliable broadband service for rural residents.

–Nebraska Revised Statutes 86-1102(3)(c)

Findings

A review of alternative broadband technologies found that several emerging technologies may be well-suited for rural areas:

- Fixed wireless technologies using mid-band spectrums could potentially provide service of 100 Mbps or greater in rural areas.
- SpaceX (Starlink) is the first company to provide broadband service via low Earth orbit satellites and is now offering its beta service to users at some locations in Nebraska. SpaceX states that users during the initial beta service can expect speeds from 50 to 150 Mbps down and latency from 20 milliseconds to 40 milliseconds. Starlink requires a clear view of the sky to connect. During the beta period, users experience brief periods of no connectivity. SpaceX has over 1,600 satellites in orbit as of August 2021. When fully deployed, the Starlink constellation expects to have approximately 30,000 satellites in orbit. Some industry groups have raised concerns that Starlink may experience a capacity shortfall in 2028.
- TV white space has received significant attention. However, it may be better suited for lower bandwidth or non-line-of-sight applications.

Key Findings

- Fixed wireless technologies using mid-band spectrums could potentially provide service of 100 Mbps or greater in rural areas.
- SpaceX (Starlink) is now offering its beta service to users at some locations in Nebraska.

Drone in a Soybean Field Photo Credit United Soybean Board Creative Commons License CC BY 2.0

For more information, see Broadband Technologies in the Appendix.

Nebraska Universal Service Fund and Reverse Auction

Examine the role of the Nebraska Telecommunications Universal Service Fund in bringing comparable and affordable broadband services to rural residents and any effect of the fund in deterring or delaying capital formation, broadband competition, and broadband deployment.

–Nebraska Revised Statutes 86-1102(3)(b)

Examine alternatives for deployment of broadband services to areas that remain unserved or underserved, such as reverse auction programs described in section 4 of this act, public-private partnerships, funding for competitive deployment, and other measures, and make recommendations to the Public Service Commission to encourage deployment in such areas.

–Nebraska Revised Statutes 86-1102(3)(d)

Findings

The Nebraska Universal Service Fund (NUSF) provides support to price cap, rate of return, and mobile wireless carriers in Nebraska. A total of $36,545,562 is available for broadband projects in high cost areas through the NUSF in 2021. This amount includes $16,402,282 allocated for price cap carriers and $8,388,571 allocated for rate-of-return carriers. Additionally, $11,753,709 in unallocated 2017-2020 support was made available for price cap carriers in 2021.

Since 2019, 19,583 households have been connected through broadband projects funded through the Nebraska Universal Fund.

The total remittances to the NUSF have increased from approximately $32.8 million in 2018 to $46.8 million in 2020. The increase is due to the Nebraska Public Service Commission's actions to reform the contribution methodology for residential services to a per connection fee starting on April 1, 2019. In 2021, the Commission made further changes to the contribution mechanism by moving to a connections-based methodology for business services. This modification is projected to increase the size of the fund to approximately $52 to $55 million.

Even with steps to stabilize the fund, however, the size of the fund is not sufficient to provide support for fiber deployment to all Nebraska residences and businesses.

Through the NUSF-99 and NUSF-108 dockets, the Nebraska Public Service Commission has established a preference for fiber deployment projects.

LB 338, passed by the Legislature and signed by Governor Ricketts on May 5, 2021, requires that funds distributed from the NUSF for construction of new fixed broadband infrastructure shall go to projects that provide broadband service scalable to at least 100 Mbps down and 100 Mbps up beginning on January 1, 2022.

Key Recommendations

- Evaluate the results of the Nebraska Public Service Commission's expected reverse auction of NUSF support.
- Coordinate the distribution of NUSF support with other funding sources to avoid duplication of funding and to target funding to areas most in need of support.
- As funding from multiple sources is being utilized for broadband deployment projects, state and federal policymakers will need to develop mechanisms to ensure that these networks are supported.

The Commission has also put accountability measures in place to ensure support is used for its intended purpose. Programs administered by the Commission have moved the fund toward a grant-like method of distribution whereby carriers must build first before receiving reimbursement. LB 338 further improved accountability by requiring recipients of ongoing high-cost NUSF support to conduct and submit speed tests as determined by the commission.

In order for providers to make decisions about broadband infrastructure investments, support from the NUSF should be sustainable and predictable.

Nebraska Legislature has authorized the Nebraska Public Service Commission to redirect NUSF support through a reverse auction or community-based plan through LB 992 in 2018 and LB 338 in 2020.

The Nebraska Public Service Commission is establishing rules and procedures for a reverse auction and is expected to move through the process of redirecting support in 2022, which could result in conducting a reverse auction. The Nebraska Public Service Commission has established a process by which 80% of the support for price cap carriers is allocated for broadband deployment projects. Price cap carriers were required to notify the Public Service Commission how they planned to use their support by July 16, 2021. Carriers which did not plan to use at least 95% of the support allocated to them would have their unused support redirected to other carriers. Approximately $3 million of support allocated is expected to be redirected in 2022.

LB 338, passed during the 2021 legislative session, adds a community-based redirection of support option for support that goes unused by a price cap carrier. The Commission will open a docket to promulgate rules for that option.

The NUSF Subcommittee found no evidence that the Nebraska Universal Service Fund has deterred or delayed capital formation, broadband competition, and broadband deployment in conversations with stakeholders or in the subcommittee's research efforts.

Recommendations

- Monitor the Nebraska Public Service Commission's efforts to stabilize the Nebraska Universal Service Fund by modernizing the contribution system.
- Monitor the Nebraska Public Service Commission's efforts to modernize the distribution method and improve provider accountability through the system of grant-like awards for broadband infrastructure projects.
- Evaluate the results of the Nebraska Public Service Commission's expected reverse auction of NUSF support.
- Coordinate the distribution of NUSF support with other funding sources to avoid duplication of funding and to target funding to areas most in need of support.
- Monitor the implementation of the FCC's Connect America Fund II and Rural Digital Opportunity Fund reverse auctions to evaluate the success of the program and to identify any key lessons learned.
- As funding from multiple sources is being utilized for broadband deployment projects, state and federal policymakers will need to develop mechanisms to ensure that the costs of maintaining these networks are supported.

Sen. Friesen and Gov. Ricketts at the signing of LB388. Photo Credit Staff

NUSF Metrics

NUSF		
Measure	**2019 Most Recent Data** Nebraska Public Service Commission	**2021 Most Recent Data** Nebraska Public Service Commission
Annual contributions to the Nebraska Universal Service Fund (By Calendar Year)	2017 - $35,321,380 2018 - $32,796,228 2019 - $18,333,749 (Through 1st Half, 2019)	2019 - $43,915,240 2020 - $46,796,572 2021 - $22,951,506 (Through June 2021)
Annual allocations from the Nebraska Universal Service Fund (By Calendar Year)	2017 – $40,087,483 2018 - $33,139,591	2019 – $42,040,143 2020 - $45,674,733 2021 - $45,300,854
NUSF-108 (Rate of Return Carrier) project-specific households covered, by year		2019 – 500 2020 – 1,020 2021 – 367 (For project notices received through July 2021)
NUSF-99 (Price Cap Carrier) project-specific households covered, by year	2017 – 643 2018 - 1,981	2019 – 7,769 2020 – 6,833 2021 – 3,094

For more information on the Nebraska Universal Service Fund, see the NUSF Overview and Support Allocations in the Appendix.

Public-Private Partnerships and Broadband Planning

Examine alternatives for deployment of broadband services to areas that remain unserved or underserved, such as reverse auction programs described in section 4 of this act, public-private partnerships, funding for competitive deployment, and other measures, and make recommendations to the Public Service Commission to encourage deployment in such areas.

–Nebraska Revised Statutes 86-1102(3)(d)

Findings

Grant programs such as the Remote Access Rural Broadband grant program and the Nebraska Broadband Bridge program are essentially a form of public-private partnerships in which public funds are used to provide funding to telecommunications companies or public-private partnerships for broadband deployment.

Nebraska's first broadband grant program, the Remote Access Rural Broadband Grant Program, demonstrated the impact of state broadband grant programs on broadband deployment. The program, which was funded by the CARES Act and administered by the Nebraska Department of Economic Development, provided $29.5 million in funding for 60 projects which brought broadband to 17,600 households.

With the support of Governor Ricketts, the Nebraska Legislature established the Nebraska Broadband Bridge grant program by enacting LB 388 in 2021 and appropriated $20 million a year for two years for the program. The first round of applications is due October 1, 2021.

Federal funding from the American Rescue Plan Act received by the State of Nebraska could provide additional funding for broadband deployment projects. Governor Ricketts and the Legislature are expected to determine the amount of funding available for broadband in early 2022.

LB 388 created the Nebraska Broadband Bridge Fund for money appropriated by the Legislature and federal funds received for broadband enhancement purposes. The fund is to be administered by the Nebraska Public Service Commission to finance grants for qualifying projects under the Nebraska Broadband Bridge Act.

Counties and municipalities may be able to use funding from the American Rescue Plan Act Local Fiscal Recovery Funds as a match for broadband grant programs or to enter into a more traditional public-private partnership with a telecommunications provider.

Additional funding from the infrastructure bill which was passed by the Senate in August 2021 may also be available for broadband projects if the legislation is enacted.

A number of resources are available to help municipalities, counties or regions with broadband planning or developing broadband public-private partnerships:

- The Nebraska Regional Officials Council (NROC) and Nebraska Development Districts launched a speed test mapping project to help Nebraska communities and regions determine where broadband is not available and to develop plans for addressing broadband availability.
- The Rural Impact Hub's Lead for Nebraska program is placing fellows in rural communities to work on projects related to economic development and broadband.
- LB 992 established a state broadband coordinator position to be housed in the Office of the CIO starting on July 1, 2022. However, the Legislature did not include funding for the position in the Office of the CIO's general funds.
- Resource materials are also available at https://ruralbroadband.nebraska.gov/resources.

Traditional models of public-private broadband partnerships have primarily been utilized in communities, but not rural areas outside of city or town limits. Some models, however, could be adapted for use in rural areas. Stakeholders should take the following considerations into account:

- Public-private partnerships should include consumer protections and ensure quality of service.
- Stakeholders should be aware that forming a public-private partnership takes time.

Stakeholders should be careful about forming a public-private partnership that addresses business needs only and leaves out residential and/or rural areas.

Public power districts and cooperatives could play a role in advancing the deployment of broadband services in rural Nebraska through public-private partnerships. Public power districts and cooperatives may own fiber rings to connect necessary electric controls and data points. The communications network enables public power districts to safely operate and manage the electric grid. The communications network could be leveraged to facilitate the deployment of broadband in rural areas in several ways:

- A public power district or cooperative could work with a local telecommunications provider to put fiber in to connect electric communication needs. The local telecommunications provider could sell some of the fiber to the public power district or cooperative. The telecommunications provider could also connect homes and businesses passed by the newly installed fiber.
- A public power district or cooperative could work with a local telecommunications provider to put fiber in to connect electric communication needs and could then lease services from the telecommunications provider. The telecommunications provider could also connect homes and businesses passed by the newly installed fiber.
- As public power districts replace aging infrastructure, fiber could be placed overhead at a cost of a few dollars per foot. The dark fiber could be leased to telecommunications providers.
- Public power districts and other public entities could aggregate their demand for telecommunications services through a joint RFP which could be put out for bid by the State of Nebraska Office of the CIO or Network Nebraska. Telecommunications providers could connect homes and businesses passed by the newly installed fiber.
- An electric cooperative could create a communications subsidiary and provide retail service, however a public power district could not.

NPPD provided partial funding to have NRTC conduct rural broadband feasibility studies for several public power districts and is working with working with these power districts to explore developing public-private partnerships and identify funding opportunities.

LB 992, enacted in 2020, made the process of leasing dark fiber by public entities less burdensome and established a process to use private utility easements for communications. LB 992 also specified that leases of dark fiber to provide broadband in areas lacking broadband of 25 Mbps download and 3 Mbps upload do not need to contribute a portion of the proceeds to the Nebraska Universal Service Fund.

Fiber swaps between public power districts and providers are another form of public-private partnership and may be easier to implement than leasing dark fiber.

The formation of broadband cooperatives may be an option for unserved and underserved areas.

Recommendations

- **Express appreciation to Governor Ricketts and the Legislature for recognizing the importance of broadband to Nebraska and for providing funding for broadband through the Nebraska Broadband Bridge grant program and the Remote Access Rural Broadband grant program.**
- **Review the initial round of awards from the Broadband Bridge grant program to determine the impact of the program.**
- **Encourage local and regional broadband planning.** Each community, county or region is different and will likely require a unique solution. Bringing stakeholders together to develop a local, county or regional plan can lay the groundwork for public-private partnerships.
- **Encourage each county or region to have a broadband coordinator to facilitate broadband planning and coordination.**

- **Encourage each county or region to leverage programs and resources such as the local economic development districts, the Rural Impact Hub's Lead for Nebraska fellows, and the state broadband coordinator expected to be staffed by July 1, 2022.**
  - » Convening local or regional meetings of telecommunications providers and public power districts to explore how the communications needs of public power could be leveraged to improve broadband availability in rural areas.
  - » Developing a joint RFP for public power districts which could be put out for bid by Network Nebraska or the Nebraska Office of the CIO.
- **Explore the creation of broadband cooperatives in unserved and underserved localities.**
- **Explore the creation of a statewide broadband association.** The association could include telecommunications providers, public power districts, schools, hospitals, municipalities, counties, and other stakeholders interested in advancing broadband in Nebraska. The association could convene regional and statewide discussions and develop and distribute resources such as model or sample agreements.
- **Retain the existing prohibition on retail provision of broadband service by public entities.** The public power industry has stated that it is not interested in retail provision of broadband services. In some states, municipalities are providing retail broadband service. Public provision of broadband without regional planning may erode the business case for providing broadband in surrounding rural areas.
- **Encourage local governments to review their rights of way and permitting processes and take steps if necessary to make the processes less burdensome for telecommunications providers.**

Public-Private Partnership Metrics

Measure	2019 Most Recent Data	2021 Most Recent Data
Number of leases of dark fiber from public entities	1 July 2019, Nebraska Public Service Commission	1 August 2021, Nebraska Public Service Commission
Number of projects funded through state grant programs*	N/A	60 Remote Access Rural Broadband Grant Program 2020
Number of households and businesses connected through state grant programs*	N/A	17,600 households Remote Access Rural Broadband Grant Program 2020
Total amount of grant funding awarded*	N/A	$29.5 million Remote Access Rural Broadband Grant Program 2020

*New Metric for 2021

Terms and Definitions

Precision and Connected Agriculture Technologies

Auto-guidance enabled farm equipment and variable rate technologies were among the first generation of precision agriculture technologies.

Auto-Guidance Enabled Farm Equipment has a global navigation satellite system (GNSS) receiver which processes satellite signals to determine position. The use of a differential correction system using satellite, Real Time Kinemetics (RTK) radio or mobile (cellular) networks improves the accuracy of the estimated geographic coordinates in real time. John Deere's RTK network offers horizontal pass-to-pass accuracy of +/-2.5 cm.

Auto guidance systems on farm equipment such as tractors, combines, harvesters, planters, seeders, and sprayers and applicators have many benefits, including reduced skips and overlaps, the ability to work in poor visibility conditions, the ability to skip certain areas and return later, and event logging.

Newer farm equipment and on-board monitors may also be able to connect to the internet via LTE or WiFi. This allows for the delivering of prescriptions for product applications and other uses. The United Soybean Board survey found that 29% of farmers and ranchers access the internet with their machinery.

Photo Credit: United Soybean Board Creative Commons License CC BY 2.0

Variable-rate technology (VRT) enables producers to precisely control the rate of application of crop inputs and tillage operations.

Next generation precision agriculture technologies include internet-connected sensors, monitors, and controllers as well as decision support systems using artificial intelligence tools. The term **connected agriculture technologies** refers to equipment and devices which are connected to the internet and programs or services which are accessed through the internet.

Internet connected devices such as soil moisture sensors, temperature sensors, flow meters on a pivot, and ear tags which monitor animal health are providing farmers and ranchers with real-time information on their crops and livestock so that they can make better decisions. The use of monitors/sensors in agriculture is still in the early adoption phase with only about 10-15% of agricultural producers widely using these technologies.

Decision support systems using artificial intelligence (AI) technologies can help farmers and ranchers make better decisions in managing their crops and livestock.

Agriculture

Determine other issues that may be pertinent to the purpose of the task force.

–Nebraska Revised Statutes 86-1102(3)(g)

Findings

Agriculture is a significant part of Nebraska's economy. The market value of crops and livestock produced in Nebraska in 2017 was $21,983,430,000 with a per farm average of $474,476.[iii]

Fully adopting next generation precision agriculture technologies in the United States would result in potential annual gross benefits of up to $13 billion for row crops and $20.6 billion for livestock and dairy with over a third of these benefits dependent on broadband.[iv]

Farmers and ranchers need upload speeds of at least 30 Mbps to transfer the immense amount of data generated to the cloud. In the future even greater upload speeds may be required.

Rural areas of most Nebraska counties—including many of Nebraska's top-producing agricultural counties—lack broadband with upload speeds of greater than 25 Mbps or fiber connectivity. The table below shows broadband availability for the rural areas of Nebraska's top-producing agricultural counties.

Key Recommendations

- Establish a state goal of having broadband access to every farm or ranch headquarters.
- Focus a portion of broadband funding on the highest cost areas.
- Review the initial round of awards from the Broadband Bridge grant program to determine if adjustments to program requirements could aid in funding extremely high cost rural areas.

% Rural Population with Broadband available (ADSL, Fiber, Cable, Fixed Wireless) Dec 2019
Top 10 Nebraska Counties by Agricultural Sales (2017)

County	Agricultural Sales ($)	% Rural Pop with 25/3	% Rural Pop with 100/10	% Rural Pop with 250/25	% Rural Pop with 100/10 Fiber
Cuming County	1,131,997,000	83.83	74.63	74.1	7.06
Custer County	781,155,000	53.02	7.21	0.13	3.25
Lincoln County	755,236,000	81.47	51.37	36.7	35.52
Dawson County	748,426,000	63.95	38.21	33.59	7.11
Platte County	688,562,000	95.06	72.08	56.61	1.26
Phelps County	578,241,000	85.9	62.42	60.18	37.16
Antelope County	529,502,000	80.12	44.25	8.46	17.45
Boone County	473,778,000	63.08	53.74	0	0
Holt County	453,539,000	75.41	16.31	0	16.31
Chase County	440,113,000	100.00	93.83	12.36	12.36

*New Metric for 2021

Source: USDA 2017 Census of Agriculture County Profiles data available at https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Nebraska/
Dec 2019 FCC Form 477 data from the FCC Broadband Map at https://broadbandmap.fcc.gov

Different methods of connectivity are required for agriculture, including:

- Low-bandwidth connectivity for devices like sensors or monitors often called Internet of Things (IoT) devices
- High speed, centralized broadband with upload speeds of at least 30 Mbps up for targeted agricultural operational headquarters such as a farm or ranch operations center
- High-speed decentralized coverage over large agricultural areas

The following connectivity profiles provide additional details about types of internet connectivity needed.

Technician checking pedestal on new fiber project. Photo Credit: Mary Ridder

Connectivity Profiles for Next Generation Precision Agriculture

	Low-Speed, Broad Coverage	High-Speed, Centralized	High-Speed, De-centralized
Geographic Coverage	Large areas (i.e., agricultural fields)	Targeted agricultural operational headquarters such as farm or ranch operations center, typically one site per producer.	Large areas (i.e., agricultural fields)
Network Speed	Slow (< 5 Mbps)	Broadband and faster (> 25 Mbps) +	Broadband and faster
Network Latency	High latency is tolerable	Low latency	Low latency
Upload/Download Speeds	Asymmetrical (faster download, slower upload) Expect small upload and downloads over time from many sensors and field devices	Symmetrical (same download and upload speeds) Expect large upload and downloads to support processing of large data files, and online training and support	Symmetrical Expect large uploads to transmit live video for remote monitoring and real-time decision making
Usage	• Transmit sensor data from fields • System automation and monitoring • Mobile access to systems and data for workers and decision makers	• Farm-level data aggregation and modeling • Raw data uploads for processing (drone and other sensor data) • Remote training and systems support • Online cattle auctions	• Field-level video streaming • Large uploads of HD videos and photos • Live video conferencing for support

Adapted from Examining Current and Future Connectivity Demand for Precision Agriculture Report Oct. 2020 by the Connectivity Working Group of the FCC's Precision Agriculture Committee pages 8-9 https://www.fcc.gov/sites/default/files/precision-ag-connectivity-demand-wg-report-10282020.pdf

Other Issues

Legal and technical issues—including data ownership and portability, right to repair, and technical standards and interoperability—may impede the full adoption of next generation precision agriculture technologies. Industry efforts to address these issues would likely accelerate the adoption of precision agriculture technologies.

Research and outreach efforts on best practices in connected agriculture technologies and the associated return on investment could accelerate adoption. Because farming varies from state to state and within regions of a state, research and outreach efforts should be localized and feature farmers and ranchers who are early adopters of next generation precision agriculture technologies.

As farmers and ranchers are increasing their reliance upon next generation precision farming applications, the risk of cyberattacks is also increasing. Food processors are also at risk as the 2021 ransomware attack on meatpacker JBS demonstrated. Industry-wide efforts to increase the security of next generation precision farming technologies and the industrial control systems used in food production will likely be needed to improve the cybersecurity of agriculture and the food industry.

Recommendations

- Establish a state goal of having broadband access to every farm or ranch headquarters.
- Focus a portion of broadband funding on the highest cost areas.
- Review the initial round of awards from the Broadband Bridge grant program to determine if adjustments to program requirements could aid in funding extremely high cost rural areas.
- Survey Nebraska farmers and ranchers on their broadband needs and broadband availability to their farms and ranches, including what percentage of their operations are covered by broadband and where broadband coverage is still needed.

For more information, see Findings and Recommendations of the Agriculture Subcommittee in the Appendix.

Benefits of Next Generation Precision Agriculture Technologies to Farmers and Ranchers

Photo Credit: United Soybean Board Creative Commons License CC BY 2.0

Next generation precision agriculture technologies provide farmers and ranchers with real-time data for decision-making. Here are examples of how farmers and ranchers in Nebraska are using real-time data for decision making:

- Farmers are using real-time data on precipitation to reduce irrigation, resulting in significant savings.
- Producers also use real-time data on wind speed and direction and documentation in order to safely spray dicambra.
- Livestock producers are using smart internet connected ear tags to monitor animal health and detect illness earlier and more accurately than visual observation.
- Cameras or monitors on water troughs can let ranchers check water supplies without having to travel to each location.
- The watering, cooling, feeding and disease management in confinement hog facilities can be managed offsite, reducing the risk of disease transmission.

Next generation precision agriculture technologies can reduce costs and increase productivity. The following tables show the potential benefits of a number of technologies and applications used by row crop farmers as well as livestock and dairy producers.

Next generation precision agriculture technologies also allow producers to spend more time with their families, improving their quality of life. For example, sensors, monitors and video cameras allow farmers and ranchers to check on their farms and ranches remotely, eliminating drive time.

Digital Inclusion, Homework Gap and Leveraging E-Rate Funding

Determine other issues that may be pertinent to the purpose of the task force.

–Nebraska Revised Statutes 86-1102(3)(g)

Recommend state policies to effectively utilize state universal service fund dollars to leverage federal universal service fund support and other federal funding.

–Nebraska Revised Statutes 86-1102(3)(e)

Findings

Those without broadband connectivity at home struggled to learn, access health care and work remotely during the COVID-19 pandemic. Approximately 12% of Nebraskans or 215,000 individuals do not have a broadband subscription at home according to data from the U.S. Census Bureau American Community Survey 2019 5-Year estimates.

- The population without a home broadband connection includes 32,000 Nebraskans under 18 years old, 102,000 Nebraskans between 18 and 64 years old, and 81,000 Nebraskans 65 years or older.
- Those under 18 are the most likely to have a home broadband connection. 93% of Nebraskans under 18 have a broadband connection at home compared to 70% of Nebraskans 65 years and older.
- Those with lower incomes and lower levels of education as well as minority populations are also less likely to have an internet subscription.
- The percent of residents with a broadband subscription varies by county from a high of 94.2% in Sarpy County to a low of 67.6% in Garfield County. See the table below for a list of the 10 Nebraska counties with the lowest subscription rates.

Key Recommendations

- Encourage public libraries and schools without fiber connections to apply for support for new fiber construction from the E-Rate Special Construction matching fund program
- Encourage school districts, ESUs, public libraries, and communities to implement programs such as Wi-Fi on buses, hotspot lending programs, low cost pay-by-the-month internet access, or alternative wireless deployments for student access on school-issued devices in order to reduce the number of unserved and underserved students.
- Encourage communities and regions to develop digital inclusion plans to address multi-generational needs.

Nebraska Counties with Lowest Subscription Rates
2019 American Community Survey 5-Year

	% Population with Broadband Subscription	Margin of Error
Deuel County	78.1%	5.0
Hitchcock County	76.1%	4.1
Loup County	75.4%	9.2
Cuming County	75.3%	3.3
Pawnee County	74.0%	4.8
Sioux County	73.9%	6.8
McPherson County	72.2%	9.4
Thurston County	70.2%	2.5
Hooker County	68.7%	9.9
Garfield County	67.6%	7.7

Federal funding helped close the device gap for students.

- The ESU Coordinating Council has estimated that the Governor's Emergency Education Relief (GEER) Fund has reimbursed for 30,209 computing devices for public and nonpublic schools, 3,862 computing devices for exempt (home) schools and 3,411 hotspots overall. Omaha Public Schools and other school districts have secured an additional 60,000 internet-enabled computing devices using ESSER funding.
- Nebraska public school districts submitted 92 applications for the FCC's Emergency Connectivity Fund, totaling $19,896,915 in potential reimbursements, with a majority of the requests going for internet-enabled computing devices.

Libraries are key community partners in providing internet and computer access to students and the general public—especially in rural areas, but just over half of Nebraska libraries serving communities with populations of less than 2,500 have internet access below 25 Mbps down and 3 Mbps up.[v]

Federal funding from the CARES Act and the Nebraska Universal Service Fund E-Rate Special Construction matching fund helped libraries improve their broadband connections and start/expand hotspot lending programs.

- The Nebraska Library Commission awarded seven public libraries with up to $165,000 in CARES Act grants to start and/or expand their library hotspot lending programs.

Boys of Fall, Photo Credit Mary Ridder

- Thirteen public libraries were connected to fiber for the first time funded by the Remote Access Rural Broadband grant program administered by the Nebraska Department of Economic Development.
- Funding from the Nebraska Universal Service Fund E-Rate Special Construction matching fund and federal E-Rate program enabled six public libraries and one school to get fiber connections in the first year (2021) of the matching fund program. The Nebraska Library Commission reports increased interest in the program and expects the number of libraries applying for funding through the E-Rate Special Construction matching program to increase.

The federal E-Rate program which provides support for broadband connections in schools and libraries is underutilized by Nebraska libraries. Only 24% of public libraries in Nebraska applied for Category 1 (external connections) funding in 2021-22, and 2% of Nebraska public libraries applied for Category 2 (internal connections) funding in year one of the latest 5-year funding period for this program. Reasons cited for not participating in the E-Rate program include the perceived difficulty in applying for funding, lack of time to learn the process and apply, and concerns about requirements for filtering internet content for children. If all Nebraska libraries fully participated in the E-Rate program, it would increase the level of USF support by:

- an estimated $210,000 in Category 1 E-Rate support per year;
- and an estimated $3.25 million in E-Rate support for Category 2 over the next five years.

Increased support for low-income households is currently being provided through the FCC Emergency Broadband Benefit Program. Over 15,000 Nebraska households enrolled in this temporary program. The federal infrastructure bill infrastructure bill currently pending in Congress includes provisions for a longer-term program which would provide a $30 per month subsidy for broadband for low-income households.

[31] *Source: Universal Service Administrative Corporation (USAC) Data Retrieval Tools: https://slpin.universalservice.org/DRT/Default.aspx*

The Broadband Bridge grant program requires applicants proposing to provide service to underserved areas to include a digital inclusion plan. The plan must describe the carrier's efforts to ensure members of the community to be served will be able to afford the services offered, and must describe any discounts and/or support programs to be offered for low-income individuals.

Closing the connectivity gap—especially in rural areas without broadband access—remains a challenge.

Recommendations

- Support the efforts of the Nebraska Library Commission to increase the number of public libraries applying for Category 1 and Category 2 E-Rate support.
- Encourage public libraries and schools without fiber connections to apply for support for new fiber construction from the E-Rate Special Construction matching fund program administered by the Nebraska Public Service Commission.
- Encourage school districts, ESUs, public libraries, and communities to implement programs such as Wi-Fi on buses, hotspot lending programs, low cost pay-by-the-month internet access, or alternative wireless deployments for student access on school-issued devices in order to reduce the number of unserved and underserved students.
- Encourage education leaders and public library staff to be part of local community discussions involving broadband services and digital inclusion.
- Encourage communities and regions to develop digital inclusion plans to address multi-generational needs.
- Encourage higher education institutions, Network Nebraska, and other partners to pursue all available funding opportunities to increase the capacity and reach of the Network Nebraska backbone, build advanced cyberinfrastructure, and foster collaboration within the statewide research community to advance institutional research and economic development missions.

Homework Gap and Digital Inclusion Metrics

Percent of Nebraskans Lacking Home Internet Subscriptions or Subscribing to Mobile Only		
Measure	**2019 Report Data**	**2021 or Most Recent Data**
Percent of Nebraskans who lack a home internet subscription	16% 2017, ACS 5-Year	11.9% 2019, ACS 5-Year
Percent of Nebraskans under 18 years of age who lack a home internet subscription	12% 2017, ACS 5-Year	9.5% 2019, ACS 5-Year
Percent of Nebraska households with a smart phone only*	3.7% 2017 ACS 5-Year	6.2% 2019, ACS 5-Year
Percent of Nebraska households with mobile only broadband subscription*	7.9% 2017, ACS 5-Year	10.1% 2019, ACS 5-Year
Percent of U.S. adults with a mobile only broadband subscription	17% 2019, Pew Research Center	15% 2021, Pew Research Center

*New Metric for 2021

Percent Nebraska Libraries and School Districts Applying for E-Rate		
Measure	**2019 Report Data**	**2021 or Most Recent Data**
Percent of Nebraska **Libraries** Applying for **Category 1** (External Connections) E-Rate	25% 2019-20, USAC	24% 2021-22,USAC
Percent of Nebraska **Libraries** Applying for **Category 2** (Internal Connections) E-Rate funding	3% 2015-20, USAC	2% 2021-22,USAC (Year 1 of a 5-year budget period)
# of Libraries Applying for Special Construction E-rate Matching Program*	N/A	6
Percent of Nebraska **K-12 public school districts** Applying for **Category 1** (External Connections) E-Rate	100% 2019-20, USAC	100% 2021-22, USAC
Percent of Nebraska **K-12 public school districts** Applying for **Category 2** (Internal Connections) E-Rate funding	98% 2015-20, USAC	49% 2021-2022, USAC (Year 1 of a 5-year budget period)

Nebraska Library Broadband		
Measure	**2019 Report Data**	**2021 or Most Recent Data**
Percent of Nebraska Libraries Serving Populations of Less than 2,500 with Internet Access of **Less than 12 Mbps**	42% FY 2017-2018, Nebraska Library Commission	23% 2020, Nebraska Library Commission
Percent of Nebraska Libraries Serving Populations of Less than 2,500 with Internet Access of **Greater than 24 Mbps**	16% FY 2017-2018, Nebraska Library Commission	48% 2020, Nebraska Library Commission
Percent of Nebraska Libraries Serving Populations of Less than 2,500 with Internet Access of **100 Mbps or Greater**	0.6% FY 2017-2018, Nebraska Library Commission	6.4% 2020, Nebraska Library Commission
# of Nebraska Libraries Servicing Populations of Less than 2,500 with **fiber connections***	--	26 2020, Nebraska Library Commission

*New Metric for 2021

Broadband Technician Workforce

Determine other issues that may be pertinent to the purpose of the task force.

–Nebraska Revised Statutes 86-1102(3)(g)

Findings

Nebraska, like the rest of the country, currently faces a shortfall of skilled workers needed to deploy broadband. Additional investments in broadband will likely increase the demand for skilled workers.

Industry trade associations estimate that there will be 850,000 more new direct broadband and 5G jobs through 2025.[vi]

Nearly complete fiber project in central Nebraska. Photo Credit: Mary Ridder

Recommendations

- The telecommunications industry, the state's community colleges, local school districts, and economic development and workforce development agencies should engage in conversations about recruitment of technicians as well as developing training and apprenticeship programs.

Sunset at the Lake, Photo Credit: Mary Ridder

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v. Information on library broadband availability is from the Nebraska Library Commission.

vi. Industry trade associations' letter to President Biden concerning telecommunications workforce available at https://wia.org/wp-content/uploads/workforce-letter-jan-2021_biden_final.pdf

Copies of the executive summary, full report, and appendices are available at:
https://ruralbroadband.nebraska.gov

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Small Town Nebraska, by Tim Vrtiska

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Sen. Friesen and Gov. Ricketts, by Staff

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Untitled (Farmer using tablet showing yield information) by United Soybean Board

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