Rural Broadband Task Force 2019 Report
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Appendix 1
Statutes

86-1101
Broadband telecommunications service; legislative intent.

The Legislature finds and declares that:

1. The availability, quality, and affordability of broadband telecommunications service is important to the residents of Nebraska; and
2. Because availability, quality, and affordability of broadband telecommunications service is lacking in certain rural areas in Nebraska, combined with greater investment in urban areas, the state may be facing a digital divide.

It is the intent of the Legislature that broadband telecommunications service in rural areas of the state should be comparable in download and upload speed and price to urban areas in the state where possible and that state resources should be utilized to ensure that the rural residents of the state should not be penalized simply because of their rural residence. It is further the intent of the Legislature that the residents of this state should have access to broadband telecommunications service at a minimum download speed of twenty-five megabits per second and a minimum upload speed of three megabits per second.

86-1102
Rural Broadband Task Force; created; members; advisory groups; staff assistance; powers; duties; expenses; meetings; report.
(1) The Rural Broadband Task Force is hereby created. Task force members shall include the chairperson of the Transportation and Telecommunications Committee of the Legislature and a member of the Legislature selected by the Executive Board of the Legislative Council who shall both serve as nonvoting, ex officio members, a member of the Public Service Commission who shall be selected by the chairperson of such commission, the chairperson of the Nebraska Information Technology Commission or his or her designee who shall act as chairperson of the task force, the Director of Economic Development or his or her designee, the Director of Agriculture or his or her designee, and the following members to be appointed by the Governor: A representative of the agribusiness community, a representative of the Nebraska business community, a representative of the regulated wireline telecommunications industry, a representative of the wireless telecommunications industry, a representative of the public power industry, a representative of health care providers, a representative of Nebraska postsecondary educational institutions, and a representative of rural schools offering kindergarten through grade twelve.

(2) The task force may appoint advisory groups to assist the task force in providing technical expertise and advice on any issue. The advisory groups may be composed of representatives of stakeholder groups which may include, but not necessarily be limited to, representatives from small and large wireline companies, wireless companies, public power districts, electric cooperative corporations, cable television companies, Internet service providers, low-income telecommunications and electric utility customers, health care providers, and representatives of educational sectors. No compensation or expense reimbursement shall be provided to any member of any advisory group appointed by the task force.

(3) The Nebraska Information Technology Commission shall provide staff assistance to the task force in consultation with staff from the Public Service Commission and other interested parties. The task force may hire consultants to assist in carrying out its duties. The task force shall review issues relating to availability, adoption, and affordability of broadband services in rural areas of Nebraska. In particular, the task force shall:

(a) 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;

(b) 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;

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

(d) Examine alternatives for deployment of broadband services to areas that remain unserved or underserved, such as reverse auction programs described in section 86-330, public-private partnerships, funding for competitive deployment, and other measures, and make recommendations to the Public Service Commission to encourage deployment in such areas;

(e) Recommend state policies to effectively utilize state universal service fund dollars to leverage federal universal service fund support and other federal funding;

(f) Make recommendations to the Governor and Legislature as to the most effective and efficient ways that federal broadband rural infrastructure funds received after July 1, 2018, should be expended if such funds become available; and

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

(4) Task force members shall serve on the task force without compensation but shall be entitled to receive reimbursement for any actual expenses incurred for such service as provided in sections 81-1174 to 81-1177.
(5) The task force shall meet at the call of the chairperson and shall present its findings in a report to the Executive Board of the Legislative Council no later than November 1, 2019, and by November 1 every odd-numbered year thereafter. The report shall be submitted electronically.
(6) For purposes of this section, broadband services means high-speed telecommunications capability at a minimum download speed of twenty-five megabits per second and a minimum upload speed of three megabits per second, and that enables users to originate and receive high-quality voice, data, and video telecommunications using any technology

86-1103
Rural Broadband Task Force Fund; created; use; investment.

The Rural Broadband Task Force Fund is created. The fund shall be used to carry out the purposes of the Rural Broadband Task Force as described in section 86-1102. For administrative purposes, the fund shall be located in the Nebraska Information Technology Commission. The fund shall consist of money

appropriated or transferred by the Legislature and gifts, grants, or bequests from any source, including federal, state, public, and private sources. Any money in the fund available for investment shall be invested by the state investment officer pursuant to the Nebraska Capital Expansion Act and the Nebraska State Funds Investment Act.

Source

- Laws 2018, LB994, §1- 3.
- **Operative Date: July 1, 2018**

Appendix 2

Nebraska Broadband Availability, Download and Upload Speeds, and Subscription Rates

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Geographic Area	% Population with Broadband	% Rural Population with Broadband	% Tribal Population with Broadband
Colorado	94.5	76.1	51.8
Iowa	91.6	79.6	70.6
Kansas	91.8	74.3	62.1
Missouri	89.0	66.0	--
Nebraska	88.7	62.5	46.3
South Dakota	90.2	78.9	67.7
Wyoming	88.6	70.6	91.38
United States	93.9	75.6	70.3

FCC Broadband Map https://broadbandmap.fcc.gov

Table 2

Percent Population with Broadband of 25/3 Available via Fiber

U.S., Nebraska and Surrounding States

June 2018 Form 477 Data

Geographic Area	% Population with 25/ 3 via Fiber	% Rural Population with 25/3 via Fiber	% Tribal Population with 25/3 via Fiber
Colorado	20.3	11.4	.4
Iowa	28.4	37.5	0
Kansas	34.2	25.4	19.9
Missouri	29.9	17.0	--
Nebraska	25.2	15.5	4.5
South Dakota	31.7	45.3	40.1
Wyoming	13.3	12.7	2.4
United States	33.1	16.5	14.1

FCC Broadband Map https://broadbandmap.fcc.gov

Table 3

Percent Population with Mobile 10/3 Mbps Broadband Available

United States, Nebraska and Neighboring States

December 2017

Area	Mobile LTE 10/3 Mbps	Mobile LTE 10/3 Mbps Rural
United States	89.0%	69.3%
Colorado	93.3%	78.8%
Iowa	79.7%	74.3%
Kansas	97.8%	95.3%
Missouri	84.4%	66.1%
Nebraska	83.3%	56.4%
South Dakota	99.5%	97.7%
Wyoming	0.0%	0.0%

2018 FCC Communications Marketplace Report Appendix D-1 available at https://docs.fcc.gov/public/attachments/FCC-18-181A9.pdf

Figure 1

Percent of Population with 25/3 Broadband Available by Nebraska County

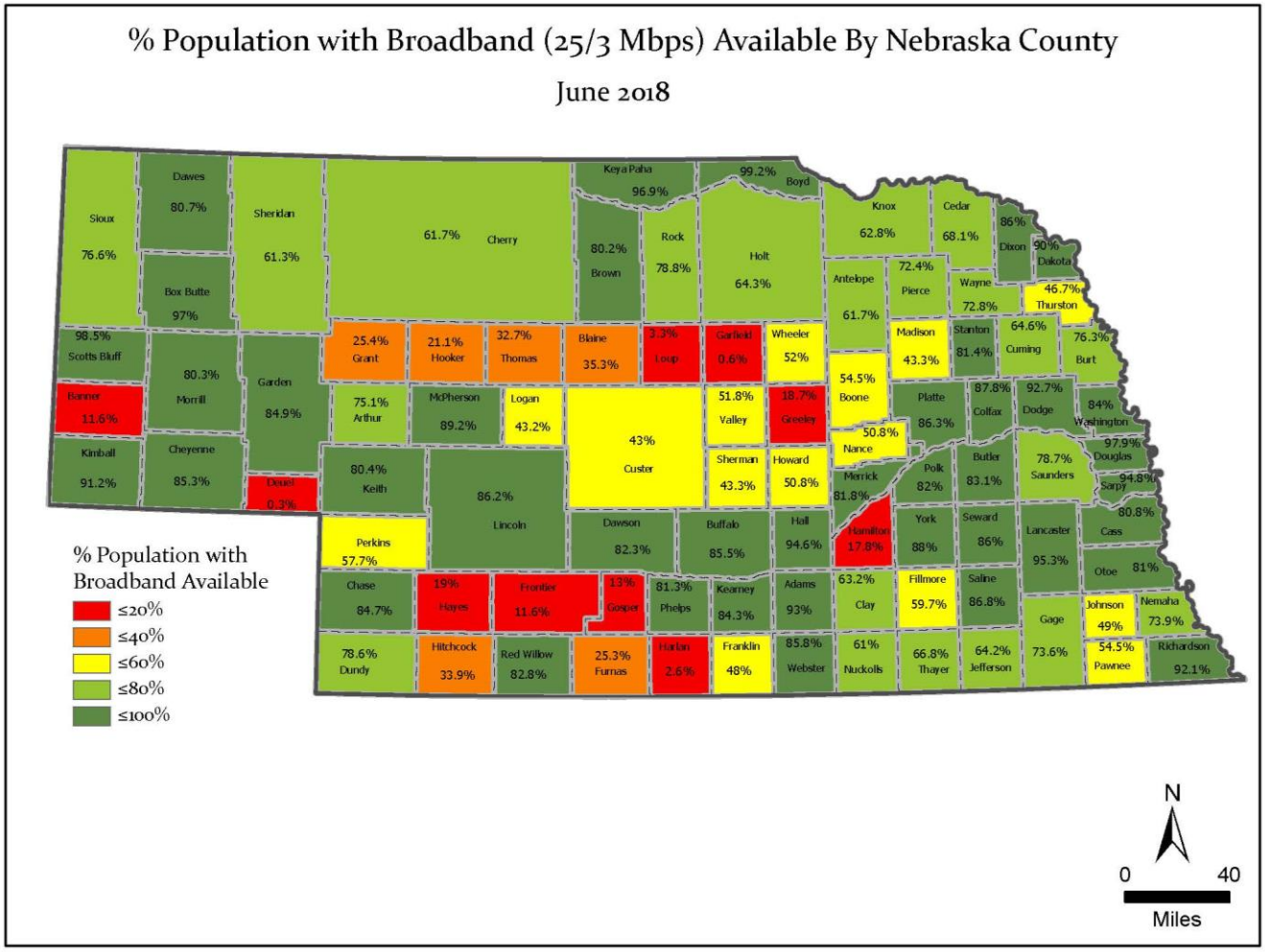
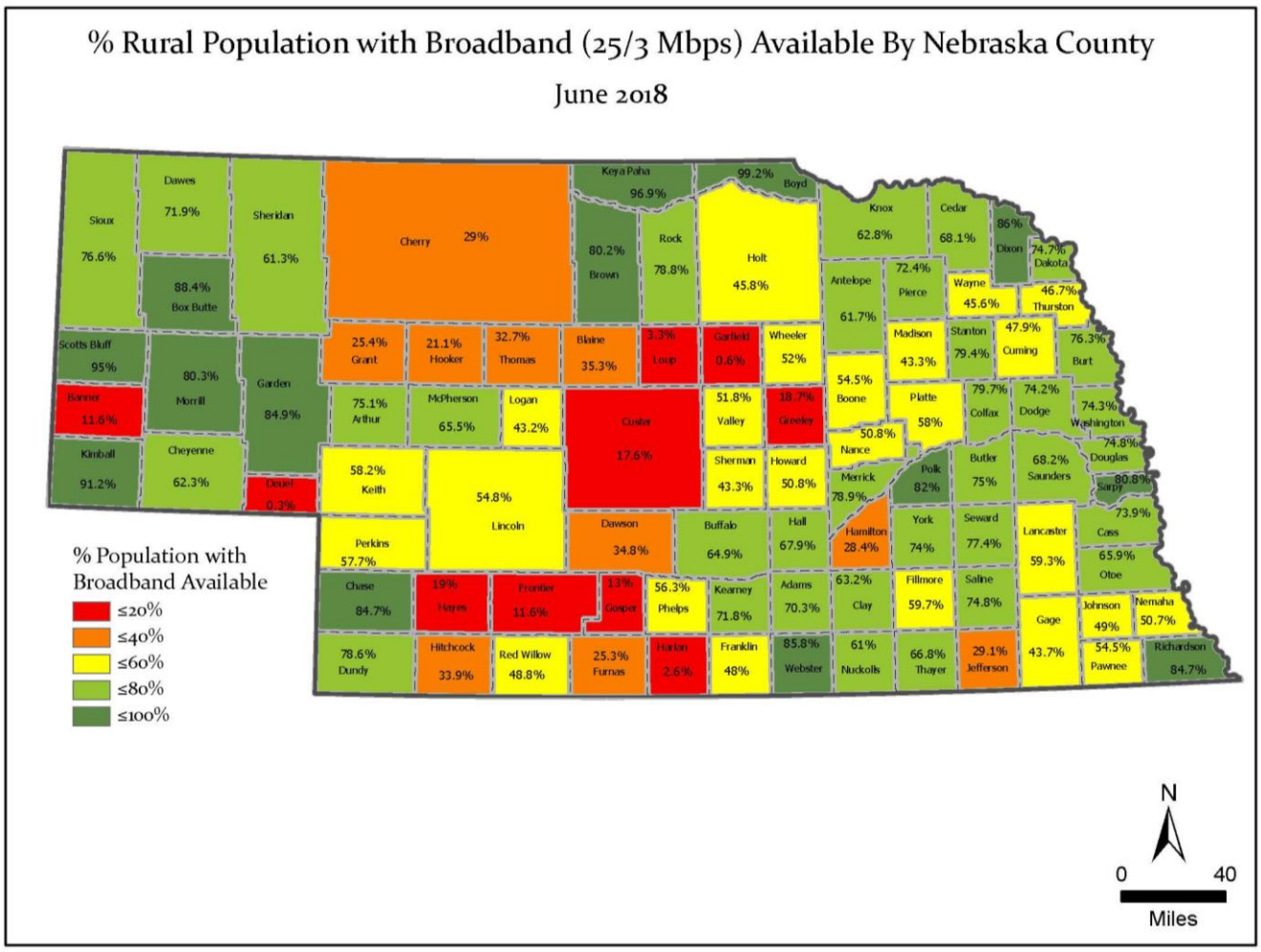


Figure 2
Percent of Population with 25/3 Broadband Available by Nebraska County



2018 FCC Communications Marketplace Report Appendix D-5 available at https://docs.fcc.gov/public/attachments/FCC-18-181A9.pdf

Table 4

Percent Population with 25/3 Mbps Fixed Terrestrial Broadband Available
Nebraska Counties

June 2018

Area	All	Rural	Tribal
Adams, NE	93.0	70.3	--
Antelope, NE	61.7	61.7	--
Arthur, NE	75.1	75.1	--
Banner, NE	11.6	11.6	--
Blaine, NE	35.3	35.3	--
Boone, NE	54.5	54.5	--
Box Butte, NE	97.0	88.4	--
Boyd, NE	99.2	99.2	--
Brown, NE	80.2	80.2	--
Buffalo, NE	85.5	64.9	--
Burt, NE	76.3	76.3	100.0
Butler, NE	83.1	75.0	--
Cass, NE	80.8	73.9	--
Cedar, NE	68.1	68.1	--
Chase, NE	84.7	84.7	--
Cherry, NE	61.7	29.0	--
Cheyenne, NE	85.3	62.3	--
Clay, NE	63.2	63.2	--
Colfax, NE	87.8	79.7	--
Cuming, NE	64.6	47.9	1.5
Custer, NE	43.0	17.6	--
Dakota, NE	90.0	74.7	--
Dawes, NE	80.7	71.9	--
Dawson, NE	82.3	34.8	--
Deuel, NE	0.3	0.3	--
Dixon, NE	86.0	86.0	88.0
Dodge, NE	92.7	74.2	--
Douglas, NE	97.9	74.8	--
Dundy, NE	78.6	78.6	--
Fillmore, NE	59.7	59.7	--
Franklin, NE	48.0	48.0	--
Frontier, NE	11.6	11.6	--
Furnas, NE	25.3	25.3	--
Gage, NE	73.6	43.7	--

Area	All	Rural	Tribal
Garden, NE	84.9	84.9	--
Garfield, NE	0.6	0.6	--
Gosper, NE	13.0	13.0	--
Grant, NE	25.4	25.4	--
Greeley, NE	18.7	18.7	--
Hall, NE	94.6	67.9	--
Hamilton, NE	17.8	28.4	--
Harlan, NE	2.6	2.6	--
Hayes, NE	19.0	19.0	--
Hitchcock, NE	33.9	33.9	--
Holt, NE	64.3	45.8	--
Hooker, NE	21.1	21.1	--
Howard, NE	50.8	50.8	--
Jefferson, NE	64.2	29.1	--
Johnson, NE	49.0	49.0	--
Kearney, NE	84.3	71.8	--
Keith, NE	80.4	58.2	--
Keya Paha, NE	96.9	96.9	--
Kimball, NE	91.2	91.2	--
Knox, NE	62.8	62.8	42.0
Lancaster, NE	95.3	59.3	--
Lincoln, NE	86.2	54.8	--
Logan, NE	43.2	43.2	--
Loup, NE	3.3	3.3	--
Madison, NE	89.2	65.5	--
McPherson, NE	43.3	43.3	--
Merrick, NE	81.8	78.9	--
Morrill, NE	80.3	80.3	--
Nance, NE	50.8	50.8	--
Nemaha, NE	73.9	50.7	--
Nuckolls, NE	61.0	61.0	--
Otoe, NE	81.0	65.9	--
Pawnee, NE	54.5	54.5	--
Perkins, NE	57.7	57.7	--
Phelps, NE	81.3	56.3	--
Pierce, NE	72.4	72.4	--
Platte, NE	86.3	58.0	--
Polk, NE	82.0	82.0	--

Area	All	Rural	Tribal
Red Willow, NE	82.8	48.8	--
Richardson, NE	92.1	84.7	100.0
Rock, NE	78.8	78.8	--
Saline, NE	86.8	74.8	--
Sarpy, NE	94.8	80.8	--
Saunders, NE	78.7	68.2	--
Scotts Bluff, NE	98.5	95.0	--
Seward, NE	86.0	77.4	--
Sheridan, NE	61.3	61.3	100.0
Sherman, NE	43.3	43.3	--
Sioux, NE	76.6	76.6	--
Stanton, NE	81.4	79.4	--
Thayer, NE	66.8	66.8	--
Thomas, NE	32.7	32.7	--
Thurston, NE	46.7	46.7	46.7
Valley, NE	51.8	51.8	--
Washington, NE	84.0	74.3	--
Wayne, NE	72.8	45.6	--
Webster, NE	85.8	85.8	--
Wheeler, NE	52.0	52.0	--
York, NE	88.0	74.0	--

FCC Broadband Map https://broadbandmap.fcc.gov

Table 5

Percent Population with Broadband of 25/3 via Fiber Available

Nebraska Counties

June 2018

Area	All	Urban	Rural	Tribal
Adams, NE	70.2	77.4	46.9	--
Antelope, NE	18.1	--	18.1	--
Arthur, NE	75.1	--	75.1	--
Banner, NE	0.0	--	0.0	--
Blaine, NE	33.8	--	33.8	--
Boone, NE	1.9	--	1.9	--
Box Butte, NE	87.5	91.8	75.1	--
Boyd, NE	99.2	--	99.2	--
Brown, NE	26.2	--	26.2	--
Buffalo, NE	9.8	12.9	4.2	--
Burt, NE	19.5	--	19.5	100.0
Butler, NE	8.3	0.0	12.3	--
Cass, NE	13.9	0.0	19.0	--
Cedar, NE	42.2	--	42.2	--
Chase, NE	18.8	--	18.8	--
Cherry, NE	12.0	0.0	22.3	--
Cheyenne, NE	0.1	0.1	0.0	--
Clay, NE	4.3	--	4.3	--
Colfax, NE	0.0	0.0	0.0	--
Cuming, NE	11.8	35.3	0.0	0.0
Custer, NE	1.3	0.0	1.9	--
Dakota, NE	33.6	33.1	35.5	--
Dawes, NE	16.4	0.0	40.3	--
Dawson, NE	35.3	46.5	5.4	--
Deuel, NE	0.0	--	0.0	--
Dixon, NE	44.9	--	44.9	0.0
Dodge, NE	14.1	11.2	22.4	--
Douglas, NE	31.6	32.0	14.5	--
Dundy, NE	78.5	--	78.5	--
Fillmore, NE	4.1	--	4.1	--
Franklin, NE	34.8	--	34.8	--
Frontier, NE	11.2	--	11.2	--
Furnas, NE	25.3	--	25.3	--
Gage, NE	0.1	0.0	0.1	--

Area	All	Rural	Tribal	Area
Garden, NE	2.5	--	2.5	--
Garfield, NE	0.0	--	0.0	--
Gosper, NE	0.0	--	0.0	--
Grant, NE	22.8	--	22.8	--
Greeley, NE	0.0	--	0.0	--
Hall, NE	1.5	1.7	0.6	--
Hamilton, NE	11.0	6.4	15.3	--
Harlan, NE	0.5	--	0.5	--
Hayes, NE	15.9	--	15.9	--
Hitchcock, NE	33.7	--	33.7	--
Holt, NE	29.6	36.3	26.1	--
Hooker, NE	20.0	--	20.0	--
Howard, NE	0.1	--	0.1	--
Jefferson, NE	0.0	0.0	0.0	--
Johnson, NE	0.0	--	0.0	--
Kearney, NE	35.3	55.4	19.1	--
Keith, NE	66.6	98.8	30.0	--
Keya Paha, NE	96.9	--	96.9	--
Kimball, NE	0.0	--	0.0	--
Knox, NE	11.9	--	11.9	0.3
Lancaster, NE	27.0	29.0	10.7	--
Lincoln, NE	78.5	96.6	37.5	--
Logan, NE	0.3	--	0.3	--
Loup, NE	3.3	--	3.3	--
Madison, NE	2.8	1.7	5.3	--
McPherson, NE	22.9	--	22.9	--
Merrick, NE	10.3	0.0	17.1	--
Morrill, NE	28.2	--	28.2	--
Nance, NE	0.6	--	0.6	--
Nemaha, NE	48.5	99.1	3.2	--
Nuckolls, NE	35.3	--	35.3	--
Otoe, NE	54.7	99.4	19.3	--
Pawnee, NE	4.2	--	4.2	--
Perkins, NE	0.2	--	0.2	--
Phelps, NE	20.4	16.0	26.5	--
Pierce, NE	29.1	--	29.1	--
Platte, NE	1.5	2.1	0.2	--
Polk, NE	1.1	--	1.1	--

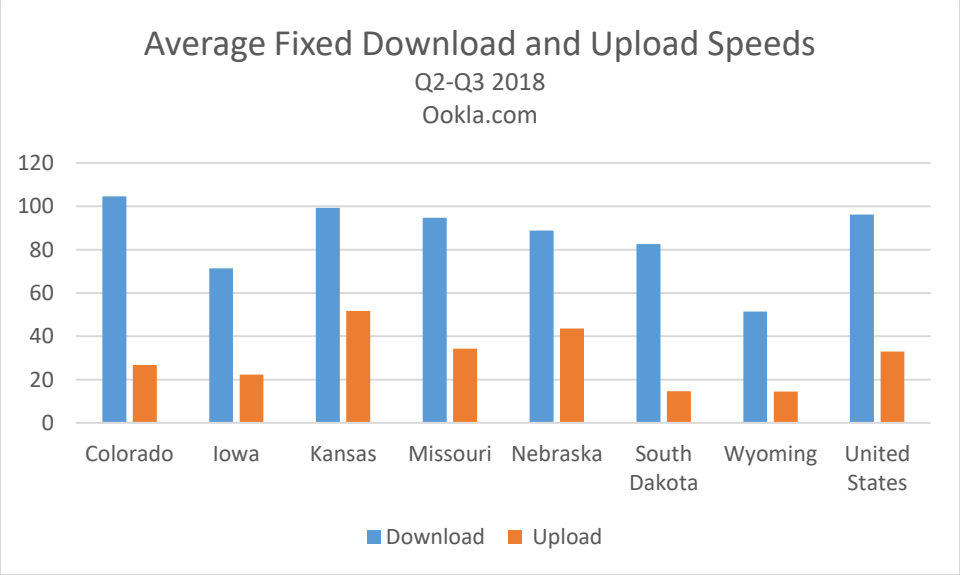
Area	All	Rural	Tribal	Area
Red Willow, NE	7.2	0.3	22.0	--
Richardson, NE	79.5	100.0	60.3	100.0
Rock, NE	9.6	--	9.6	--
Saline, NE	0.0	0.0	0.0	--
Sarpy, NE	15.4	15.8	10.7	--
Saunders, NE	13.2	0.0	19.7	--
Scotts Bluff, NE	72.1	98.0	13.7	--
Seward, NE	6.6	4.7	7.9	--
Sheridan, NE	6.7	--	6.7	100.0
Sherman, NE	0.0	--	0.0	--
Sioux, NE	9.2	--	9.2	--
Stanton, NE	42.6	0.0	56.3	--
Thayer, NE	0.0	--	0.0	--
Thomas, NE	31.6	--	31.6	--
Thurston, NE	3.1	--	3.1	3.1
Valley, NE	0.0	--	0.0	--
Washington, NE	5.0	5.7	4.7	--
Wayne, NE	10.5	0.0	20.9	--
Webster, NE	49.2	--	49.2	--
Wheeler, NE	52.0	--	52.0	--
York, NE	10.1	0.0	22.1	--

Table 6
Average Fixed Upload and Download Speeds
United States, Nebraska and Neighboring States
2016 and 2018

Area	2016 Download	2018 Download	2016 Upload	2018 Upload
Colorado	53.23	104.63	17.02	26.79
Iowa	35.84	71.39	10.27	22.34
Kansas	81.67	99.34	54.07	51.68
Missouri	62.10	94.64	27.78	34.33
Nebraska	34.21	88.74	11.26	43.57
South Dakota	45.05	82.65	10.96	14.54
Wyoming	32.19	51.34	10.37	14.44
United States	54.97	96.25	18.88	32.88

2016 and 2018 Ookla speed test reports available at https://www.speedtest.net/reports/united-states/2016/; https://www.speedtest.net/reports/united-states/2018/fixed/.

Figure 2
Average Fixed Download and Upload Speeds
United States, Nebraska and Neighboring States
2018



2018 Ookla Speed Tests available at https://www.speedtest.net/reports/united-states/2018/fixed/.

Table 7

Average Mobile Upload and Download Speeds

United States, Nebraska and Neighboring States

2016 and 2018

Area	2016 Download	2018 Download	2016 Upload	2018 Upload
Colorado	13.31	26.44	5.67	7.01
Iowa	18.55	19.56	7.45	8.33
Kansas	19.14	29.56	6.33	7.94
Missouri	18.17	27.99	6.37	7.87
Nebraska	16.83	20.84	6.75	7.72
South Dakota	20.59	24.73	8.05	10.33
Wyoming	9.47	14.28	3.18	4.77
United States	19.61	27.33	7.94	8.63

2016 and 2018 Ookla speed test reports available at https://www.speedtest.net/reports/united-states/2016/; https://www.speedtest.net/reports/united-states/2018/mobile/

Table 8

Adoption Rate for Fixed Terrestrial Services

United States, Nebraska and Neighboring States

December 2017

Area	Adoption Rate at least 25 Mbps Down	Adoption Rate at Least 100 Mbps Down
Colorado	67.8%	28.1%
Iowa	46.3%	17.2%
Kansas	46.1%	27.3%
Missouri	47.0%	19.9%
Nebraska	51.2%	29.4%
South Dakota	64.4%	8.8%
Wyoming	55.3%	11.3%
United States	59.8%	29.4%

2018 FCC Communications Marketplace Report, Appendix D-8 available at https://docs.fcc.gov/public/attachments/FCC-18-181A9.pdf

Appendix 3
Role of Subcommittees and Subcommittee Members

Much of the Rural Broadband Task Force's work has been conducted by five subcommittees: the Nebraska Universal Service Fund (NUSF), Broadband Data, Broadband Technologies, Public-Private Partnerships, and Homework Gap/Leveraging Funding Subcommittees. Subcommittee members have gathered information, engaged stakeholders, and developed recommendations outside of task force meetings.

Nebraska Universal Service Fund (NUSF) Subcommittee. On October 15, 2018, the Rural Broadband Task Force formed the NUSF Subcommittee to 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."[1] Subcommittee members include Mary Ridder, Nebraska Public Service Commission; Tom Shoemaker, Pinpoint Communications and Dan Spray, Precision Technology, Inc.

Broadband Data Subcommittee. On October 15, 2018, the Rural Broadband Task Force formed the Broadband Data Subcommittee to address issues related to broadband data. The subcommittee was asked to answer the following questions:

- What data we currently have?
- What data we need?
- How can we get the data we need but don't have?

Subcommittee members include Senator Bruce Bostelman, Nebraska Legislature; Andrew Buker, University of Nebraska; Dan Spray, Precision Technology, Inc. and Anna Turman, Catholic Health Initiative.

Broadband Technologies Subcommittee. On November 7, 2018 the Rural Broadband Task Force formed the Broadband Technologies Subcommittee to review "the feasibility of alternative technologies and providers in accelerating access to faster and more reliable broadband service for rural residents."[2] Subcommittee members include Zachary Hunnicutt, Hunnicutt Farms; Ron Cone, EUS 10 and Dan Spray, Precision Technology, Inc.

Public-Private Partnerships Subcommittee. On Dec. 10, 2018, the Rural Broadband Task Force formed the Public-Private Partnerships Subcommittee to examine how public-private partnerships could best be leveraged to accelerate access to faster broadband in rural areas. Subcommittee members include Tim Lindahl, Wheat Belt Public Power District and Tom Shoemaker, Pinpoint Communications.

Homework Gap/Leveraging Funding Subcommittee The Homework Gap/Leveraging Funding Subcommittee is charged with identifying strategies to address the homework gap and making recommendations on leveraging universal service and other funding especially for schools and libraries. Subcommittee members include Andrew Buker, University of Nebraska; Ron Cone, ESU 10 and Dan Spray, Precision Technologies, Inc.

[1] Nebraska Revised Statutes 86-1102(3)(b)
[2] Nebraska Revised Statutes 86-1102(3)(c)

Appendix 4
Supplemental Information—Broadband Data and Mapping

Initial Broadband Data Subcommittee Findings

March 21, 2019

Broadband Data Subcommittee

On October 15, 2018, the Rural Broadband Task Force formed the Broadband Data Subcommittee to address issues related to broadband data. The subcommittee was asked to answer the following questions:

- What data we currently have?
- What data we need?
- How can we get the data we need but don't have?

Subcommittee members include Senator Bruce Bostelman, Dan Spray, Andrew Buker and Anna Turman. Additionally, the subcommittee invited a number of interested stakeholders and subject matter experts to share information, including:

- Ansley Mick, Nebraska Farm Bureau
- Dr. Angela Hollman, University of Nebraska Kearney
- Dr. Matthew Miller, University of Nebraska Kearney
- Dr. Tim Obermier, University of Nebraska Kearney
- Nick Paden, Remboldt Law
- Cullen Robbins, Nebraska Public Service Commission
- John Watermolen, State of Nebraska Office of the CIO
- Tim Erickson, Nebraska Legislature
- Johnathan Hladik, Center for Rural Affairs

What Data on Broadband Availability Do We Currently Have?

Form 477 Data

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. Form 477 also asks providers to report the total number of subscribers by technology companywide, but not by census block. 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 not a set schedule for data releases, but data is usually released a year or more after the reporting date.

Mobile wireless providers provide polygons of their service area and the minimum speeds that are publicly available.

The FCC also publishes a broadband map based on Form 477 data it collects from providers. The map includes functionality to analyze broadband availability by state, county, Congressional District, census place, tribal area, and MSA.

Advantages. There are several advantages to using FCC Form 477 data. The data is currently available and does not require additional reporting by providers. Since existing data is used, there is no cost to the state for acquisition of the data.

Limitations/Concerns. 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. See the table below.

Census Block Size	# Blocks	% of Blocks	Total Sq. Miles	% of Sq. Miles
<=1	176,107	91%	23,868	31%
1-2 sq. miles	11,371	6%	14,342	19%
2-3 sq. miles	2,304	1%	5,437	7%
3-4 sq. miles	1,062	1%	3,692	5%
> 4	2,508	1%	30,021	39%
	193,352		77,359	

Additionally, census blocks are updated only every 10 years.

The propagation maps submitted by at least one major wireless carriers may be overstating coverage. These coverage area maps are the basis of the FCC's Mobility Fund, which has been challenged by a number of parties in a number of states. On Dec. 7, 2018, the FCC announced that it was opening an investigation into whether one or more major carriers overstated their coverage.

The time lag between reporting and release of Form 477 data is also a limitation. Eighteen months can lapse between when broadband deployment actually occurs and when it is reflected in a publicly released Form 477 dataset.

Speed Test Data

UNK BOB Study. Dr. Tim Obermier, Dr. Angela Hollman, and Dr. Matthew Miller are currently conducting a residential fixed broadband speed test study sponsored by Nebraska Public Power District, Nebraska Rural Electric Association, CoBank, and Tri-State. Participating households receive a BOB (Big Operation Bandwidth) unit which collects multiple speed tests per day. Users also take a survey on internet type, cost and satisfaction. As of February 2019, results have been collected from 320 participants. The project team intends to continue collecting data. The State of Nebraska Office of the CIO has offered mapping assistance to the UNK team.

Nebraska Farm Bureau Mobile Wireless Speed Tests. The Nebraska Farm Bureau collected over 2,000 mobile speed tests using the FCC's speed test app. However, only 605 (27.5%) of the tests were usable/mappable. The Nebraska Farm Bureau intends to continue collecting data. A map developed by the State of Nebraska Office of the CIO is available at https://nebraska.maps.arcgis.com/apps/opsdashboard/index.html#/3fd4e11eb7e04b31a0eb0b7adec710e4

Microsoft. Using download data from September 2018, Microsoft identified the number of people at a county level who are using the internet at broadband speeds (25mbit down/3mbit up). Microsoft's analysis also identified counties where there are particularly large disparities between the FCC and Microsoft's data.

Ookla/Speedtest.net. Ookla publishes annual speed test reports on fixed and mobile broadband speedtest data which includes average download speeds by states and the 100 largest U.S. cities. Some states and organizations contract with Ookla for speed tests and network analytics.

NACO, RURAL LISC, and RCAP. On March 4, 2019 the National Association of Counties (NACo), the Rural Community Assistance Partnership (RCAP) and Rural LISC (Local Initiatives Support Corporation) announced the development of the TestIT mobile speed test app. Snapshots of individual tests will be collected within a database, allowing partners to analyze connectivity data across the country.

Broadband Adoption Data

Computer and Internet Use Supplement. The NTIA has periodically sponsored the Computer and Internet Use Supplement to the Current Population Survey since 1994. It includes over 50 questions about internet use, including devices and internet access locations, locations of use, online activities, reasons for non-use, and privacy and security concerns. The Digital Nation Data Explorer enables tracking of metrics on computer and internet use over time.

American Community Survey 5-Year Estimates—Computer and Internet Use. Tables for 5-year estimates of computer ownership and internet subscription were made available for the first time on Dec. 6, 2018, enabling data analysis for smaller geographic areas. The data includes estimates on all geographic areas down to the tract and block group level. Users can search for data and create maps at American Fact Finder.

2018 Nebraska Rural Poll conducted by the University of Nebraska included a number of questions on internet access, satisfaction and use.

Gauging the Digital Readiness of Nebraska Households. This 2018 survey of internet users includes information on device ownership, internet access and usage.

What Data Do We Need?

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The subcommittee discussed mapping and data collection at address level, land parcel and road segment level, before recommending moving toward address level data collection and mapping. Information on these three levels of mapping are listed below.

Address Level. There is a mailing address for every household in the state. Providers have addresses for their customers and could provide the data. Mapping/geocoding can be trickier depending upon how clean the data is—especially in rural areas. The NextGen 911 address point database is expected in 12-18 months and could possibly help with geocoding.

Advantages: There is a mailing address for every household in Nebraska.

Address level data provides the necessary level of granularity.

Providers are likely to have service addresses for their customers.

The NextGen 911 address point database, expected to be completed in the next 12 to 18 months, could be leveraged.

Disadvantages: Geocoding addresses works less well in rural areas although the NextGen 911 address point database would help.

Additional state funding may be required.

Providers may incur additional costs to prepare and submit broadband service data by address points.

Federal agencies do not have access to a database of address points. Both the U.S. Census and Postal Service are prohibited by law from sharing address data. This limits federal mapping efforts and the ability of states to leverage the federal broadband maps to create address level maps.

Land Parcel Level. Parcel data is available for every county in Nebraska. Counties are the source of the data. The Department of Revenue uses the data for tax districts. The OCIO is working with the Department of Revenue to collect the land parcel data yearly. Counties have the most current data. Some parcels do not have households in them. The data lacks that information.

Advantages: Land parcel data is available for every county in Nebraska.

Disadvantages: Land parcel data lacks some information such as if a household is in them.

Additional state funding may be required.

Providers may incur additional costs to prepare and submit broadband service data by land parcels.

Road Segment Level. The Department of Transportation uses linear referencing such as mile marker to mile marker. The data could be analyzed to give an average score to a road segment. Road segment data may work better for mobile and 5G data.

Advantages: This data could be reported in a way which is granular enough.

Disadvantages: The Nebraska Department of Transportation only has data on state and federal roads.

Additional state funding may be required.

This method may be more difficult for providers to report.

Providers may incur additional costs to prepare and submit broadband service data by road segments.

How Do We Get the Data We Need

The Broadband Data Subcommittee identified several strategies which may be utilized to develop an address level data and mapping program for fixed broadband providers.

Collect Address Level Data From Providers. The Subcommittee recommended asking providers to submit address level data annually. Several states are currently collecting address level data from fixed broadband providers. Since states do not have the authority to compel providers to report broadband availability, it can be challenging to get telecommunications providers to voluntarily provide data on where they are providing broadband. Several state broadband mapping programs report that they are missing data from a number of providers. For example, Kansas awarded Connected Nation a $300,000 contract to update the state broadband map. Several ISPs, including AT&T, are not providing coverage data for the map. Connected Nation reported having data from 70% of providers in Kansas. Colorado also collects broadband availability data from providers, but reports that only about 50% of providers submit data. An outreach effort which clearly identifies the benefits to providers can help improve participation.

At this time, the subcommittee recognizes that there are significant issues with the data submitted to the FCC by mobile wireless providers. The subcommittee recommends that the FCC approve more stringent and comprehensive mapping requirements for mobile wireless providers. Until such a time as this is accomplished, the existing FCC Form 477 data can be used as a rough estimate of coverage.

Supplement Address Level Data from Providers with Additional Sources of Data. Several states supplement their broadband maps with additional sources of data. Colorado and several other states use Form 477 data for non-reporting providers to supplement their data collection efforts.

A number of states also use speed tests to provide information on the speeds that consumers are actually experiencing. Nebraska could explore incorporating or speed test data from the UNK or Nebraska Farm Bureau speed test projects or in contracting with Ookla. Involving local community leaders and organizations in speed test collection efforts can improve the number of tests submitted.

Some states have implemented a challenge process to correct known deficiencies in the map—particularly if the map is used for eligibility for grants or tax exemptions.

The Universal Service Administrative Corporation (USAC) High Cost Universal Broadband (HUBB) could also potentially be used to supplement address level data submitted by carriers. Carriers participating in the Connect America Fund programs must file deployment data with USAC's HUBB (High Cost Universal Broadband) portal showing where they are building out broadband by precise location. Not all carriers are required to report using HUBB and carriers only report data on new deployments so this data set is incomplete. The Nebraska Public Service Commission can access this data, but the data is confidential. The confidentiality requirements may limit how this data may be used or displayed.

Leverage NextGen 911 Address Point Database. To support NextGen 911, the PSC is developing an address point database. The database could potentially be used to support broadband mapping efforts as well.

Leverage Federal or National Data Collection Efforts If Possible. There are several federal or national efforts which may potentially be leveraged.

On March 21, 2019, USTelecom announced a broadband mapping pilot with Missouri and Virginia. The pilot project is expected to take 4-6 months. The results of the pilot will be reported to the FCC. If the initiative is adopted by the FCC, a comprehensive map would take 18 months to 2 years to develop. The pilot will use multiple sources of address, building and parcel data to develop a database of broadband serviceable addresses. The pilot will test different methods for reporting service availability. The pilot will also develop and test a crowdsourcing platform to enable consumers to report information.

There may be opportunities to partner with the NTIA on its broadband map. The NTIA recently received $7.5 million to improve the broadband map. However, the NTIA was not given the authority or budget to undertake a new data collection effort so it is using existing Form 477 data from the FCC, other federal agencies, and states. The NTIA also does not have access to a national database of address points which further limits its ability to create an address level map. In February 2019, NTIA announced that it is partnering with eight states – California, Maine, Massachusetts, Minnesota, North Carolina, Tennessee, Utah, and West Virginia – to supplement Form 477 data with data collected by these states. The NTIA broadband map may also contain layers from other Federal partners such as the Department of Interior. The map is expected to be available in September of 2019.

Additionally, Nebraska should monitor any changes to the data collection efforts of the FCC and USCAC to see if these data collection processes could be leveraged. The FCC updates Form 477 every four or five years. It is about time for an update. However, the FCC has concerns about the reporting burden on providers. FCC staff have indicated that a move to address level data collection is not likely. If changes were made to Form 477, it would likely take 18 months from the date an order is issued before providers would be required to meet any new reporting requirements. If additional carriers were required to report via USAC's HUBB and issues surrounding confidentiality requirements were resolved, HUBB data could also be potentially leveraged.

Cost Estimates

There would likely be additional costs incurred in moving to an address level map. Although the approach outlined by the subcommittee differs in some respects from the approach in the broadband mapping bill (LB 549) introduced in 2019, LB 549's fiscal note provides an estimate of the expected cost of moving to an address-level map. The fiscal note estimated that $841,667 would be required in year one and $881,896 in year two. Connected Nation's contract to develop the Kansas Broadband Map was for $300,000 and provides an additional estimate. It should be noted that the Kansas map provides less functionality than Nebraska's current broadband map. For example, the map doesn't show speed tiers just if an area has at least 25 Mbps down/3 Mbps up or not. There could be additional costs for obtaining or incorporating speed test data.

Appendix 5
Supplemental Information—Broadband Technologies

Overview

On November 7, 2018 the Rural Broadband Task Force formed the Broadband Technologies Subcommittee to review “the feasibility of alternative technologies and providers in accelerating access to faster and more reliable broadband service for rural residents.” Subcommittee members include Zachary Hunnicutt, Ron Cone, and Dan Spray. In addition to alternative technologies, subcommittee members also included a review of technologies currently being used to deploy broadband to provide a frame of reference.

Here is the list of technologies reviewed by the Rural Broadband Subcommittee:

- Wireline Technologies—Digital Subscriber Line (DSL)
- Wireline Technologies—Fiber
- Power Line Technologies—AirGig
- Fixed Wireless—TV White Space
- Fixed Wireless—Millimeter Wave
- Fixed or Mobile Wireless—Educational Broadband Service (EBS)
- Fixed or Mobile Wireless—Citizens Broadband Radio Service (CBRS)
- Mobile Wireless—5GSatellite—Low Earth Orbit

Wireline Technologies—Digital Subscriber Line (DSL)

Description	This family of technologies (including ADSL2+, VDSL, VDSL2) provides internet access by transmitting digital data over a local telephone network.
Bandwidth Capabilities	1.5 Mbps up to 50-100 Mbps using the newest xDSL protocols. Speeds are distance dependent and are often provided as asymmetric bandwidth. Current VDSL@ standards provide 100 Mbps @ 500 meters maximum distance. Typical ADSL speeds are 24/3 Mbps depending on distance.
Effective Distance	5.5 km (18,000 feet) without a repeater
Scalability/Future Proof	Except at short distances, DSL probably won't provide the speeds--especially upload speeds-needed by consumers in the future.
Typical Construction Costs Per Subscriber	$655-$1100
Barriers	Distance limitations of using existing cable infrastructure to meet increasing bandwidth needs
Pros	Uses the existing telephone network; can be bundled/unbundled with traditional voice service
Cons	Very distance sensitive, higher quality cable allows longer distance Asymmetric
Overall Feasibility	Currently widely used, but may not be the best technology for future needs.
Sources and Links	**Broadband 101 Video with Jason Axthelm, Nebraska Broadband Today Conference 2017** **Whatis.com** **Broadband Recommendations: Meeker County, Minnesota County by Design Nine (August 2018)**

Wireline Technologies—Fiber

Description	Fiber technology converts electrical signals to optical laser signals carrying data
Bandwidth Capabilities	Up to 10 Gbps or more. An upper limit has not been found.
Effective Distance	Up to 25 miles (Passive Optical Network/PON Fiber) and up to 50 miles (Active Ethernet)
Scalability/Future Proof	Scalable and future proof
Typical Construction Costs Per Subscriber	$3,250-$3,500
Barriers	Expensive to deploy due to build costs
Pros	Up to 10 Gbps or more. Fiber has a life expectancy of 30-40 years or more.
Cons	Expensive to deploy
Overall Feasibility	May be too expensive to deploy in rural areas without additional support
Sources and Links	**Broadband 101 Video with Jason Axthelm, Nebraska Broadband Today Conference 2017**

Wireline Technologies—Cable Modem

Description	Cable providers deliver broadband using the same coaxial cable used to deliver cable TV service using DOCSIS (Data over Cable Service Interface Specification). This is a shared bandwidth service.
Bandwidth Capabilities	Up to 10 Gbps down/1 Gbps up using DOCSIS 3.1
Effective Distance	Up to 100 miles
Scalability/Future Proof	The asymmetric nature of cable modem service is a limitation for some consumers and will likely be more of an issue in the future.
Typical Construction Costs Per Subscriber	$2,500 to $3,500
Barriers	Cable modem technology is usually only deployed within towns.
Pros	Good download speeds and generally one of the more affordable options for consumers in towns
Cons	Asymmetric and shared bandwidth service
Overall Feasibility	Since cable service is typically only available within city limits, cable modem service isn't a feasible technology for reaching rural areas outside of town.
Sources and Links	**Broadband 101 Video with Jason Axthelm, Nebraska Broadband Today Conference 2017**

Power Line Technologies—AirGig

Description	AirGig is being tested by AT&T with a reported availability date of 2021. AirGig uses antenna modules called eggs which are clamped on power lines to send data signals which cling to the wire. A demonstration in September 2018 showed data capacity of 90 gigabits per second (Gbps). To link to a home, AT&T will likely use more conventional wireless equipment like 5G mobile networks. AT&T began testing the technology with Georgia Power in 2017. In January 2019, AT&T said it is discussing testing and building commercial-grade AirGig equipment with suppliers.
Bandwidth Capabilities	Possibly 100 Mbps
Scalability/Future Proof	Unknown
Barriers	Public power providers could not provide telecommunications services directly, but could partner with telecommunications providers.
Pros	Power line infrastructure is in place which may reduce implementation costs.
Cons	Power line infrastructure is vulnerable to damage due to severe weather events such as ice storms or tornadoes.
Overall Feasibility	Potentially promising
Sources and Links	Stephen Shankland. AT&T AirGig could mean 100-megabit rural broadband in 2021. (Sept. 10, 2018) C|Net Joan Engebretson. AT&T plans to test 5G with AirGig, Seeks AirGig Manufacturers (Jan. 30, 2019). Telecompetitor

Wireless Spectrum Overview

Bands	Spectrum Range	Coverage v. Capacity
Low-Bands TV White Space 554-698 MHz	Below 1 GHz	Offer greater coverage due to longer range and building penetration, but less capacity.
Mid-Bands Millimeter Wave 2.4 Ghz, 5 GHz Educational Broadcast Service (EBS) 2495-2690 GHz Citizens Band Radio Service (CBRS) 3550-3700 MHz Wireless Fiber 3700-4200 MHz	2 GHz to 6 GHz	Offer a combination of coverage and capacity.
High-Bands Millimeter Wave 30-300 GHz	Above 24 GHz	Offer enormous capacity, but limited propagation. Good for short distances and line of sight.

The FCC currently has spectrum sharing proceedings open on TV White Space, Citizens Band Radio Service, "Wireless Fiber," Educational Broadband Service (EBS), and Extending Unlicensed and Wi-Fi Across 6 GHz.

Source: SHLB webinar on Key Concepts in Spectrum Policy, Feb. 2019.

Fixed Wireless—TV White Space

Description	Point to multipoint wireless Internet delivery via unlicensed UHF frequencies in the 470-698 MHz range. "White Space" refers to the unoccupied channels previously used to deliver television broadcasts.
Bandwidth Capabilities	3-24 Mbps Future TVWS technology may allow for channel bonding and aggregation of up to 60 Mbps.
Effective Distance	~3-6 miles Line-of-Sight (LOS) delivery. Less than that distance with Non-Line-of-Sight (NLOS) delivery.
Scalability/Future Proof	Developing technology, current FCC regulations limit the effectiveness of this technology specifically in truly rural areas. The FCC recently increased the limitation on antenna height above ground level from 30 meters to 100 meters. The FCC is considering auction of the upper TVWS channels above channel 37, thereby leaving channels 14-36 for open development.
Typical Construction Costs Per Subscriber	~$1,000-$1,500 in rural areas. Current sectors are only able to support ~20 clients, but range does not allow for sparsely populated areas to reach that density therefore raising the per subscriber cost. **Estimated Costs:** Base station $5,000-$15,000 plus customer premise equipment $300-$700 per site
Typical Operational Costs Per Subscriber	~$20-$40/month depending on delivered speeds
Barriers	Current FCC regulations and costs per subscriber in low density areas
Possible Incentives	This technology could work well in rural communities and customer sites just outside of city limits, incentivizing the technology buildout in those areas would be useful.
Pros	Capable of delivering NLOS broadband
Cons	Short distance ranges and bandwidth limits for NLOS delivery, until equipment improves
Overall Feasibility	TV white space may be suited for lower bandwidth agricultural internet of things applications. With Microsoft's support, the cost of customer service equipment has been coming down. Future reductions in the

	prices of customer service equipment to about $100 would likely make this technology economically feasible.
Sources and Links	

Fixed Wireless—Millimeter Wave

Description	Point-to-Multipoint 2.4Ghz, 5Ghz, 24Ghz and 60Ghz Wireless
Bandwidth Capabilities	Varied from 5 Mbps to 2.5 Gbps based on frequency and distance
Effective Distance	Varied from .6 miles to 15 miles
Scalability/Future Proof	Quite scalable and actively developed, well supported by the FCC rulings.
Typical Construction Costs Per Subscriber	~$200-$1,500 depending on frequency and distance
Typical Operational Costs Per Subscriber	~$30-$90 per month depending on bandwidth provided to the client
Barriers	These frequencies are limited to line of site and power per the FCC.
Possible Incentives	Higher density builds need to be used to adequately provide services to rural areas. Incentives for building towers and providing power to the structures could increase the profit model and make it more feasible.
Pros	Solid technology that's been around and is well supported by the FCC. Able to deliver high rate of speed at respectable distances.
Cons	Technology still needs FCC approval for higher powers in rural areas. Technology is limited to LOS delivery, this gets difficult in both urban and rural areas.
Overall Feasibility	This is a mainstream solution that needs to be well supported due to low cost of delivery

Fixed or Mobile Wireless—Educational Broadband Service (EBS)

Description	Educational Broadband Service (EBS), formerly known as the Instructional Television Fixed Service (ITFS), 2.5GHz (2495-2690 MHz) spectrum, is a high-speed, high-capacity wireless broadband service, including two-way Internet service via cellularized communication systems. Previously, only accredited educational institutions and nonprofit educational organizations could hold EBS licenses, limited to a 35-mile radius Geographic Service Area, although licensees can lease their excess capacity to commercial providers (e.g. Sprint). On July 11, 2019, the FCC released a Report and Order that will open up the spectrum to new licenses by eliminating the EBS eligibility requirements and the educational use requirements for EBS licenses,
Bandwidth Capabilities	Mature EBS networks operated over 4G/LTE are observing customer bandwidth experiences of up to 25 Mbps down, 5 Mbps up.
Effective Distance	Effective distance is determined by the power of the device radio and the height of the cellular antenna array. Mounted antennas on subscriber homes support ranges of up to 9 miles, with shorter distances for mobile cellular antennas and lower tower arrays.
Scalability/Future Proof	Speeds currently being delivered would not meet future needs. As the FCC opens up this spectrum to new licenses and development, greater speeds may be achievable.
Typical Construction Costs Per Subscriber	Varies. Large scale EBS network operators must implement a cellular array per tower or community high point, Evolved Packet Core, tower study and tower lease costs, and customer premise antennas and/or device SIM cards.
Typical Operational Costs Per Subscriber	Current EBS networks operated by non-profit educational institutions are recovering costs of $15-$25 per subscriber per month.
Barriers	The FCC has not granted any new ITFS/EBS licenses since 1995. The July 2019 Report and Order will open up the spectrum to new license applications from tribal governments and commercial providers.
Possible Incentives	If the FCC would opt to allow E-rate support of Wi-Fi on buses, public/private partnerships of infrastructure deployment could make this 2.5GHz spectrum cost-effective for addressing a portion of the rural homework gap.
Pros	EBS operated over a mature 4G/LTE wireless network is a tried and true technology that can be easily managed.

Cons	The relatively high cost of equipment and tower deployment, coupled with the short range and modest bandwidths make this technology an unlikely contender for widespread implementation in sparse, rural areas.
Overall Feasibility	The feasibility of EBS for providers serving rural areas or for educational entities to address the homework gap depends upon the outcome of the FCC's current proceeding.

Fixed or Mobile Wireless—Citizens Broadband Radio Service (CBRS)

Description	Citizens Broadband Radio Service (CBRS), 3.5GHz (3550-3700 MHz), has been dubbed the "Innovation Band" by developers. The FCC made this additional spectrum available in 2015 as a result of the National Broadband Plan. Early development is aimed at LTE mobile wireless, fixed wireless, and Wi-Fi-like IOT implementations for venues and/or buildings. CBRS could also be used to replace last-mile fiber access, deliver fixed wireless services and point to multipoint service.
Bandwidth Capabilities	Potentially 1 Gbps indoors and 5-10 times higher outdoors with line-of-sight access. Midco, a cable provider in the northern plains states, reports offering speeds of 100/20 Mbps at distance of 8.8 miles using CBRS on an experimental license.
Effective Distance	Midco, a cable provider in the northern plains states, reports offering speeds of 100/20 Mbps at distance of 8.8 mile using CBRS on an experimental license. Charter Communications has also tested fixed wireless in the 3.5 GHz in rural communities, determining it can provide at least 25/3 Mbps at "significant distances."
Scalability/Future Proof	Too early to tell.
Barriers	Development costs, and maturation of the spectrum usage and devices.
Possible Incentives	Newest spectrum made available by the FCC.
Pros	The CBRS band sits directly below and adjacent to the current NN Rural Broadband band of 3.65-3.70 GHz, making it easy for rural operators to adopt the new spectrum. The CBRS Band should significantly lower the costs of entry for non-traditional wireless carriers, and the propagation characteristics of the 3.5 GHz spectrum rivals current WiFi networks.
Cons	To use CBRS spectrum, one must request and be assigned a band by a Spectrum Allocation Server (SAS). The SAS calculates RF density and channel availability using terrain, radio propagation and current usage data before approving the request and allocating the spectrum.

Overall Feasibility	Too early to tell, but potentially promising.
Sources and Links	Testimony of Justin Forde to the Committee on Commerce, Science, and Transportation, Innovation, and the Internet, March 12, 2019 Mike Dano. Charter Hints at 25 Mbps fixed wireless speeds using 3.5 GHz in rural areas. (January 31, 2019). Fierce Wireless. Bob Brown. FAQ: What in the wireless world is CBRS? (March 14, 2014) Network World.

Mobile Wireless—4G/LTE

Description	4G LTE is the fourth generation of the mobile cellular network. It is the technology used by nearly all data-using mobile devices currently in service.
Bandwidth Capabilities	Theoretically up to 1 Gbps Practically up to 45 Mbps
Effective Distance	Several miles, up to 30-45 miles in flat terrain.
Scalability/Future Proof	Very scalable, currently available to ~90% of Americans. Still more room for growth in terms of speed and coverage area.
Barriers	Infrastructure development is expensive. Data caps and throttling reduce feasibility for use as primary broadband connection.
Pros	Widely used. All current mobile data technology revolves around 4G. Speeds are relatively fast, and nowhere near the potential upper limit.
Cons	Infrastructure development is expensive. If an area doesn't already have 4G, it likely means it is too expensive to cash flow. Terrain and vegetation can impact performance.
Overall Feasibility	4G is and will continue to be part of solving rural broadband issues.

Mobile Wireless—5G

Description	5G is the latest generation of wireless mobile communication.
Bandwidth Capabilities	Peak download speeds of 20 Gbps (theoretical) Expected user experience of ~1Gbps Increased antenna ports will increase the capacity of mobile networks by a factor of 22 or greater
Effective Distance	Very short. Small cells (miniature base stations) are required roughly every 250 meters. One estimate put it at one city block per cell.
Scalability/Future Proof	The millimeter wave technology that defines 5G and makes the increased speeds possible is impossible to spread over greater areas. It could be possible to build cells onto existing infrastructure, but .this would require significant coordination with utility companies and potentially create safety hazards.
Typical Construction Costs Per Subscriber	Unable to estimate. One estimate guessed that telecoms will spend $275 billion to roll out the technology over 7 years.
Typical Operational Costs Per Subscriber	Also unclear. AT&T has introduced a "5G" plan in some cities that only works at hotspots. Subscribers pay $70/mo for 15 gigabytes of data.
Barriers	High costs of deployment. Will not work with current mobile devices.
Pros	Very fast speeds. Universal support for development from major carriers and device manufacturers. Mobile network capacity will be vastly improved.
Cons	Distance limitations mean that covering large rural areas will be highly difficult. Current mobile devices will not work.
Overall Feasibility	While the technology could be used to handle traffic in home and office situations (and possibly farm yard networks), it seems nearly completely unfeasible to deliver broadband to rural Nebraska.
Sources and Links	Amy Nordrum, Kristen Clark and IEEE Spectrum Staff. (Jan. 27, 2017) Everything You Need to Know About 5G (Jan. 27, 2017) IEEE Ferry Grijpink, Alexandre Ménard, Halldor Sigurdsson, and Nemanja Vucevic. The Road to 5G: The inevitable growth of infrastructure cost. (February 2018). McKinsey. Aaron Pressman. AT&T Unveils Super-Fast Mobile 5G Service. Here's How Much It Costs. (Dec. 18, 2018). Fortune. http://fortune.com/2018/12/18/att-5g-price-mobile-hotspot/

Satellite—Geostationary Satellite

Description	HughesNet and Viasat have improved satellite service with Viasat advertising that it can provide up to 100 Mbps in select areas. The FCC's broadband map (with data as of June 2017) shows that service up 25 Mbps down and 3 Mbps up is available.
Bandwidth Capabilities	Advertised speeds up to 25 Mbps down and 3 Mbps up. 15 Mbps down 1 Mbps speeds are common.
Effective Distance	Available virtually anywhere in the U.S.
Scalability/Future Proof	Low Earth orbit satellites will likely replace current satellite service
Typical Operational Costs Per Subscriber	$69.99 per month for 20 GB/month at 25 Mbps down/3 Mbps up
Barriers	None
Pros	Available anywhere in Nebraska with a view of southern sky
Cons	Latency, data caps, and low upload speeds
Overall Feasibility	Latency and low upload speeds limit the use of some applications.

Satellite—Low Earth Orbit

Description	Several companies—including OneWeb, SpaceX, and Project Kuiper—are planning to launch low Earth orbit satellites to provide internet service. Deployment of satellite constellations may be far enough along to enable service as early as mid-2020. Latency may be as low as 25-35 milliseconds.
Bandwidth Capabilities	Up to 400 Mbps reported in OneWeb test
Effective Distance	Would be available anywhere
Scalability/Future Proof	Potentially scalable and future proof
Typical Construction Costs Per Subscriber	Customer equipment may be $500 or more.
Typical Operational Costs Per Subscriber	May be similar to pricing for geostationary satellite service but with higher speeds
Barriers	High cost of deploying satellite constellations Development of customer equipment
Possible Incentives	Undetermined
Pros	Would be available anywhere
Cons	Service may be limited to a certain number of subscribers within a geographic area.
Overall Feasibility	Potentially promising
Links	Jon Brodkin. OneWeb's low-Earth satellites hit 400Mpbs and 32ms latency in new test (July 17, 2019). ArsTechnica. Jon Porter. Amazon will launch thousands of satellites to provide internet around the world. (April 4, 2019). The Verge Caleb Henry. SpaceX launches 60 Starlink satellites, begins constellation buildout. (May 23, 2019). SpaceNews

Appendix 6

NUSF Overview and Support Allocations

NUSF Contributions

Funding for the NUSF has been collected via a 6.95% surcharge of in-state retail telecommunications revenue. Interstate and Internet services are not subject to the NUSF surcharge. Specific categories of services subject to the NUSF surcharge are:

- Local service, including connection charges, enhanced service, such as Caller ID, and Extended Area Services (EAS);
- Wireless services, including cellular, PCS, and paging;
- In-state long distance services, including prepaid calling card, operator-assisted, collect, calling card and private line; and
- Voice over the Internet Protocol (VoIP) service.

As consumers have disconnected landline phone service and carriers have moved services away from what is assessable, remittances to the NUSF have dropped. See Table 1 below.

Table 1 NUSF Remittances
2013-2018

Year	Total Remittances	Percentage change
2013	$51,943,788	
2014	$49,474,147	-4.75%
2015	$45,599,105	-7.83%
2016	$39,853,514	-12.6%
2017	$35,321,421	-11.4%
2018	$32,744,511	-7.3%

In October 2017, the Commission issued an order determining that it would adopt a connections-based mechanism. The Commission, in a subsequent proceeding, set the targeted level of the fund between $46 and $54 million and set a residential per connection surcharge at $1.75. The Commission left the assessment of business services at 6.95% of assessable revenues. The new surcharge methodology was implemented April 1, 2019 for all remitting carriers.

NUSF Distribution

Price cap carriers, rate of return carriers, and mobile wireless carriers receive support from the Nebraska Universal Service Fund. The Nebraska Public Service Commission has established separate distribution mechanisms for each of these carrier types.

Price Cap Carriers. Price cap carriers include the three largest carriers in the state: CenturyLink, Windstream, and Frontier (also known as Citizens Telecommunications of Nebraska). Through NUSF-99, the Nebraska Public Service Commission has taken steps to modernize the NUSF by transitioning the fund from only supporting landline telephone service to also supporting broadband.

Perhaps more importantly, most of the funds that price cap carriers receive are treated, in part, like a grant program. Specifically, a portion of the funds allocated to price cap carriers can only be accessed if the carriers apply for funding for broadband projects. These funds are allocated specifically to each of the carriers and remains allocated to them until they are approved for a project. In 2016, the allocation was split 50/50 for grant and funds for on-going costs. In 2017, the PSC has adopted an 80/20 split of annual NUSF support for price cap carriers, where 80% is allocated for broadband projects, and 20% is allocated for ongoing expenses, which must be used for "provision, maintenance, and upgrading of facilities." This 80/20 split was maintained in subsequent years, and continues into the current year (2019). A carrier's unused balance can be carried over. The following table shows how support has been allocated to Price Cap Carriers since the "grant" methodology was started in 2016:

Table 2 NUSF Support Allocation for Price Cap Carriers
2016-2019 (As of May, 2019)

Year	Total Support Allocated	Company	Amount Requested	Balance
2016	$ 1,527,374	Frontier/Citizens	$ 1,527,374	$ -
	$ 2,473,501	Windstream	$ 2,473,501	$ -
	$ 5,467,471	Centurylink/UTC of the West	$ 5,253,013	$ 214,458
2017	$ 2,199,943	Frontier/Citizens	$ 1,798,104	$ 401,839
	$ 4,394,372	Windstream	$ 2,301,366	$ 2,093,006
	$ 7,951,126	Centurylink/UTC of the West	$ 6,217,675	$ 1,733,451
2018	$ 1,822,449	Frontier/Citizens	$ -	$ 1,822,449
	$ 3,640,329	Windstream	$ -	$ 3,640,329
	$ 6,586,769	Centurylink/UTC of the West	$ 5,150,766	$ 1,436,003
2019	$ 1,822,448	Frontier/Citizens	$ -	$ 1,822,448
	$ 3,640,329	Windstream	$ -	$ 3,640,329
	$ 6,586,769	Centurylink/UTC of the West	$ 3,949,382	$ 2,637,387
Total	$ 48,112,880		$ 28,671,181	$ 19,441,699

Rate of Return Carriers. In 2018, the Commission completed an effort to reform how support is distributed to rate of return carriers. Through its NUSF-108 proceeding, the Commission sought to incentivize broadband buildout, increase accountability, account for federal support received by carriers, and efficiently target support to areas of need. The Commission decided to use a cost model, the State Broadband Cost Model (SBCM), to base determinations of support for rate of return carriers. This cost model is essentially the same as the model used for the Connect America Fund (CAF) Phase II process, and both model fiber to the home buildout. The Commission used the SBCM to determine allocations of support for both ongoing costs and broadband deployment for each rate of return carrier. Each carrier's allocation depended on how much of its territory was already capable of 25/3 service, and how much needed to still be built out. For example, if a carrier was completely built out with fiber to the home in their entire service territory, they would not need deployment support, and would only receive ongoing support. Conversely, if a carrier had no areas capable of 25/3 support, they would receive most of their support in deployment funds. In order to avail themselves of the deployment support allocated to companies, carriers must notify the Commission of where they intend to complete projects, and then seek reimbursement for the costs of the project. Projects can only be completed in blocks that are not 25/3 capable and are not supported through the Alternative Connect America Cost Model (A-CAM). Through this methodology, the Commission can track where broadband has been deployed, where it needs to be deployed, and where projects are occurring to deploy it.

The Commission initially proposed that areas where A-CAM support was designated would not receive support through the mechanism outlined. There is a progression order (P.O. #4) currently open to further examine that issue.

Initial allocations of support for 2019 are shown in the following table:

Table 3 NUSF Initial Support Allocations for Rate of Return Carriers 2019

Company Name	Final Ongoing Support	Final Broadband Deployment Support	Total Support
ABB - Huntel	$ -	$ 190,511	**$ 190,511**
Arapahoe	$ 223,504	$ 937,616	**$ 1,161,120**
Benkelman	$ 209,853	$ 175,865	**$ 385,717**
Cambridge	$ 187,622	$ 90,648	**$ 278,271**
Clarks	$ 234,328	$ -	**$ 234,328**
Consolidated Telco	$ 5,408	$ 110,042	**$ 115,450**
Consolidated Tele	$ 445,779	$ 77,369	**$ 523,148**
Consolidated Telecom	$ 41,456	$ 234,150	**$ 275,606**
Cozad	$ 51,352	$ 322,117	**$ 373,469**
Curtis	$ 39,701	$ 122,463	**$ 162,164**
Dalton	$ -	$ 648,674	**$ 648,674**
Diller	$ 260,101	$ 214,278	**$ 474,380**
Elsie	$ -	$ 6,424	**$ 6,424**
Glenwood NS	$ 258,546	$ -	**$ 258,546**
Glenwood TMC	$ 963,241	$ -	**$ 963,241**
Great Plains	$ 299,046	$ 1,204,462	**$ 1,503,509**
Hamilton	$ 59,814	$ 878,022	**$ 937,835**
Hartington	$ 181,270	$ -	**$ 181,270**
Hartman	$ 193,440	$ 147,989	**$ 341,429**
Hemingford	$ 382,644	$ -	**$ 382,644**
Henderson	$ 137,479	$ -	**$ 137,479**
Hershey	$ 72,026	$ 179,561	**$ 251,587**
Hooper	$ 7,205	$ 4,745	**$ 11,949**
K&M	$ 90,163	$ 11,871	**$ 102,033**
Nebraska Central	$ 295,718	$ 309,592	**$ 605,311**
Northeast Nebraska	$ 1,765,612	$ -	**$ 1,765,612**
Pierce	$ 19,782	$ 26,983	**$ 46,765**
Plainview	$ 186,428	$ -	**$ 186,428**
Sodtown	$ -	$ -	**$ -**
Southeast Nebraska	$ 385,048	$ -	**$ 385,048**
Stanton	$ 183,544	$ -	**$ 183,544**
Three River	$ 713,711	$ -	**$ 713,711**
Wauneta	$ 167,440	$ 145,416	**$ 312,856**
Total	$ 8,061,261	$ 6,038,797	$ 14,100,058

Mobile Wireless Carriers. The NUSF-92 program includes funding to support tower builds for mobile wireless carriers. Each year, the Commission opens a docket to request applications from carriers to build towers. The applications are evaluated to make sure that projects are in rural areas, are in areas where coverage is needed, and consequently are not built in close proximity to existing towers, and as long as the project is considered rural, provides service to as many potential users as possible. Individual tower applications are ranked to determine the locations where support would best be utilized.

The support amounts made available to wireless carriers for 2016, 2017, and 2018 are shown below. Determinations of support for individual carriers for the 2018 grant cycle have not yet been made.

Table 4 NUSF Support Allocations for Mobile Wireless Carriers
2016-2019

Year	Total Support	Company	Support Allocated
2016	$ 4,000,000.00	US Cellular	$ 2,486,525.00
		Viaero	$ 915,945.00
		Pinpoint	$ 597,530.00
2017	$ 4,000,000.00	US Cellular	$ 2,152,250.00
		Viaero	$ 1,808,611.00
2018	$ 3,200,000.00	US Cellular	$ 2,589,900.00
		Viaero	TBD

Appendix 7

Broadband Coverage in ILEC Territories by Any Provider – Area (Square Miles) and Households (HH) as of June 2018

Carrier	Total Area of Rural Census Blocks	Total Rural HH in Census Blocks	Area Covered by 25/3	HH covered by 25/3	HH not covered by 25/3	% Area - 25/3	% HH - 25/3
Windstream	10,062	28,206	2,374	10,875	17,331	24%	39%
Centurylink - UTC of the West and Qwest/Centurylink	23,757	46,377	9,315	31,383	14,994	39%	68%
Great Plains Comm.	17,187	11,417	3,850	2,486	8,931	22%	22%
Frontier (Citizens)	5,337	9,271	925	3,889	5,382	17%	42%
Nebraska Central Tel. Co. [2]	4,091	3,431	366	266	3,165	9%	8%
Consolidated Companies	11,098	2,907	4,262	821	2,086	38%	28%
American Broadband	2,256	4,112	1,067	2,215	1,897	47%	54%
Hamilton Telephone Company [1]	658	1,417	65	129	1,288	10%	9%
ATC Comm. (Arapahoe)	1,351	897	241	150	747	18%	17%
Pierce Tel. Co., Inc.	355	864	83	265	599	23%	31%
Dalton/Elsie Telephone Co.	2,092	724	479	184	540	23%	25%
Diller Tel. Co. (Diode Comm.)	300	467	5	7	460	2%	1%
Cozad Telephone Company	254	494	13	43	451	5%	9%
Hershey Cooperative Tel. Co.	346	462	28	119	343	8%	26%
Hooper Tel. Co. (WesTel Systems)	211	553	119	296	257	56%	54%
BW Telecom (Benkelman/Hartman/Wauneta)	1,614	644	927	432	212	57%	67%
K&M Telephone Co.	1,053	396	568	217	179	54%	55%
Northeast Nebraska Tel. Co. (including Clarks)	3,546	3,935	3,362	3,835	100	95%	97%
Sodtown Tel. Co.	79	94	1	0	94	1%	0%
Glenwood Network Services	980	483	699	430	53	71%	89%
Cambridge Tel. Co.	459	274	309	222	52	67%	81%
Glenwood Tel. Mem. Corp.	1,083	1,215	1,067	1,192	23	99%	98%
Three River Tel. Co.	1,749	589	1,692	581	8	97%	99%
Southeast Nebraska Tel. Co.	419	703	407	696	7	97%	99%
Henderson Cooperative Tel. Co.	121	250	117	244	6	97%	98%
Hemingford Cooperative Tel. Co. (Mobius)	1,092	361	1,052	356	5	96%	99%
Stanton Telecom, Inc.	202	350	199	346	4	99%	99%
Plainview Telephone	225	306	222	303	3	99%	99%
Hartington Telecomm. Co., Inc.	204	440	202	439	1	99%	100%
Total	92,181	121,639	34,015	62,421	59,218	37%	51%

[1] In their comments filed September 16, 2019, Hamilton indicated that 100% of their residents have access to 25/3 Mbps speeds

[2] In their comments filed September 17, 2019, Nebraska Central indicated that they can provide 25/3 Mbps service to 1,584 of 4,374 rural households in their territory

Notes and Methodology

- Broadband coverage data reported in this table was derived from FCC Form 477 data. The most recent version available at the time the table was compiled reflected deployments as of June 30, 2018. FCC Form 477 data is reported on a census block level, and involves self-reported information from carriers.
- Household information was derived from 2010 US Census data.
- The table analyzes the extent to which 25 Mbps download/ 3 Mbps upload speeds have been deployed within an incumbent local exchange carrier's (ILEC's) rural, incumbent territory, by **any** FCC Form 477-reporting carrier, including fixed wireless providers.
- For this analysis, census blocks that overlap into multiple ILEC territories were included in both (or all, if a block covered more than 2 companies) companies' data. This is a clear source of error, and in some cases, may lead to overstating the availability of broadband. This issue highlights one of the limitations of using census block-level data; a more complete analysis of the limitations of FCC Form 477 data is included in the report from the Data Subcommittee.
- This appendix was developed as part of the NUSF Subcommittee report. As such, the definition of rural used for this analysis is the definition developed by the PSC for the NUSF. Census blocks from the 2010 US Census were considered rural if:
    - Block had fewer than 20 households and less than 42 households per square mile
    - Block was not classified as within a city or village
    - Block was not within census-designated city limits
- Methodology:
    - 1. For each ILEC company, all 2010 census blocks that were completely or partially within the exchange boundaries of the company were selected.
    - 2. All census blocks classified as urban were removed from the analysis
    - 3. The number of households and the overall area of the remaining census blocks were input as the total rural area and households in Appendix 7
    - 4. Form 477 data from June 30, 2018 was used to select from each of those areas only those blocks where **any** carrier had reported deployment of services that were 25/3 Mbps down/up or greater. The number of households and total area of those remaining blocks were summed and included in Appendix 7.

Appendix 8
Public Private Partnership Resources

Public Private Partnership Models

The following descriptions of public-private partnerships are meant to show partnership models which may work for rural Nebraska communities and regions. Every community and region is different. What works for one community or region may not work for another.

Community-Telecommunications Provider Partnerships

Communities Facilitate Broadband Deployment

Gothenburg, Nebraska. Community leaders in Gothenburg worked together to educate community members about the importance of broadband and to attract a competitive provider. The community built a business case for providing broadband by surveying residents, compiling lists of interested customers, and collecting deposits.

Source: *Broadband 102 Nebraska Broadband Today Conference Oct. 2017 Video*
https://www.youtube.com/watch?v=dw0YawhSBrY&list=PLXAZ85-_Ay7HrsE6-16tqzD4Giiezd9vc&index=11&t=0s

Funding: The Gothenburg Improvement Company provided assistance.

Ravenna, Nebraska. Prairie Hills Wireless is providing high-speed wireless internet access of up to 150 Mbps in central Nebraska with a service area including Amherst, Boelus, Cairo, Hazard, Kearney, Litchfield, Loup City, Miller, Pleasanton, Ravenna, Rockville, and Riverdale. The City of Ravenna worked with Prairie Hills Wireless on special use permits and allowed Prairie Hills Wireless to use the municipal water tower.

Source: *Ravenna Leverages Social Media, Wireless Broadband*
http://www.nitc.nebraska.gov/news/community/2018MarRavenna.html

Funding: No public funding was provided.

Seward County, Nebraska. Seward incentivized a fiber optic service provider, Great Plains Communications, to build in its historic downtown business district by utilizing LB 840 funds.

The Local Option Municipal Economic Development Act established by LB 840 in 1991 authorizes incorporated cities and villages to collect and appropriate local tax dollars—including sales and/or property tax for economic development purposes. In order to utilize LB 840 funds, a community must develop a local economic development plan and have it approved by voters. The approved plan becomes the basis for the collection and expenditures of LB 840 funds for economic development. Over 60 Nebraska communities are currently eligible to offer loans, grants, and other activities through LB 840.

Seeing the success in Seward, the county expanded its efforts to improve broadband infrastructure to Milford, Seward County's second largest community. The county ran a similar game plan in Milford, utilizing LB 840 funds to incentivize fiber to the business district. The county also used some philanthropy funds to build fiber to the home in Milford as well.

"What is exciting about the investment that was made through LB 840 in Seward, in particular, is that investment tends to attract more investment. And investments along with fiber to the business district

actually led to fiber to the home. We had Bluestem Fiber choose to come into Seward as one of their pilot communities to build fiber to the home. And really the only complaint we've heard is when are you going to get to my home. They can't build fast enough. We are fortunate to have that level of investment in both Seward and Milford. And really our long-term goal is to be potentially the first fiber to the home county in the state."

Building community support was also important to Seward County's success. Through talking to business owners during business retention and expansion visits, internet connectivity was identified as an issue—especially in downtown Milford. Members of the LB 840 committee, which included the superintendent of the schools in Milford, also identified the need for better internet access for telecommuters and for students needing internet access to complete homework.

Source: *Seward County Attracts Investments in Broadband Infrastructure*
http://www.nitc.nebraska.gov/news/community/2018MarSewardCo.html

Funding: LB 840 funding, philanthropic funds

Jackson County, Colorado has a population of 1,000 and an area of 1,600 square miles. The incumbent provider had no more bandwidth to supply an additional customer and provided no broadband service outside of Walden. Efforts to attract a competitive provider were complicated by a lack of affordable middle mile access. With $260,313 in grant funding from the Colorado Broadband Deployment Board and a local match of 25%, Jackson County contracted with VistaBeam to bring broadband in via microwave from Wyoming.

Funding: Grant funding and local match of 25%

Source: *Northwest Colorado Council of Governments Regional Broadband Program Five Year Report (March 2018)*
http://nwccog.org/wp-content/uploads/2018/11/Broadband_5YrReport_2018_MASTER.pdf

How Could This Model Be Incentivized

- Building community capacity/leadership can help communities and regions work together to address broadband development.
- Facilitating permitting and right of way can also reduce costs and save time for providers.
- Funding from grants, community groups, philanthropic funds or LB 840 funds can help make a business case.

Legal/Regulatory Barriers

- Local right of way, pole attachment, and permitting processes and fees may be a barrier

Communities Build and Lease Infrastructure

Northwest Colorado Broadband Project, Steamboat Springs, CO. The City of Steamboat Springs, RE-2 School District, Yampa Valley Electric Association, and Yampa Valley Medical Center worked together to reduce their transport and bandwidth by building a 7.5 mile fiber network connecting anchor institutions, creating a Carrier Neutral Location (CNL), and aggregating their transport and bandwidth needs. Construction of the $2.2 million fiber optic trunk line was aided by a $748,195 state grant. The Northwest Colorado Broadband Project has also contracted with an ISP to utilize their fiber network to provide broadband services in the county.

Sources: *Northwest Colorado Council of Governments Regional Broadband Program Five Year Report (March 2018)http://nwccog.org/wp-content/uploads/2018/11/Broadband_5YrReport_2018_MASTER.pdf*

Tom Ross. Steamboat Pilot. (Oct. 26, 2017) $2.2M project bringing more affordable broadband to Steamboat https://www.steamboatpilot.com/news/2-2m-project-bringing-more-affordable-broadband-to-steamboat/

Funding: State grant, partner contributions

Ammon, Idaho operates an open-access fiber network. Broadband improvement Districts for neighborhoods were created to fund last mile connections. Property owners can opt to pay for the cost of connecting their properties to the fiber backbone.

Source*: Broadband Communities March/April 2017*
http://www.nitc.nebraska.gov/news/community/2018MarRavenna.html

Funding: Special Improvement Districts

Legal/Regulatory Barriers

- Neb. Revised Statutes Section 86-577 places restrictions on leasing of dark fiber by public entities. Section 86-594 prohibits public entities which are not public power suppliers from providing retail or wholesale broadband or telecommunications services. Section 68-595 prohibits public power suppliers from providing retail telecommunications services.

How Could This Model Be Incentivized

- Building community capacity/leadership can help communities and regions work together to address broadband development.
- Facilitating permitting and right of way can also reduce costs and save time for providers.
- Funding from grants, community groups, philanthropic funds or LB 840 funds can help make a business case.

Telecommunications-Electric Partnerships

Public Power Acts as an Anchor Tenant and Leases Fiber/Co-Owns Towers

Custer Public Power District. Consolidated Telephone and Custer Public Power District have co-owned two towers for many years. Custer Public Power provides the power and Consolidated provides the bandwidth to entities leasing space on the towers.

Building on their history of working together, Consolidated and Custer Public Power had a series of conversations on the broadband and power needs of both organizations. They developed a concept to get fiber to Custer Public Power District's towers and substations. Custer Public Power will provide aid of construction to build out the fiber network. Consolidated is designing the network to connect additional customers. Custer Public Power District also has similar agreements in place with Nebraska Central Telephone and Great Plains.

Source: *Brian Thompson presentation to Rural Broadband Task Force, Dec. 10, 2018 https://ruralbroadband.nebraska.gov/meetings/task-force/2018Dec10presentations.pdf and Public Private Partnership Subcommittee meeting with Rick Nelson, Custer County Public Power on Feb. 20, 2019.*

Funding: Partners provide funding

Legal/Regulatory Barriers: None

Public Power Acts as an Anchor Tenant But Owns its Fiber

Polk County Rural Public Power District did a study to see what it would cost to build fiber to its substations. They asked telecommunications providers if they were interested in partnering. Three were interested. Originally, Polk County Rural Public Power District was interested in owning the fiber network and leasing it, but determined that there were tax issues with this model. They are now partnering with a telecommunications provider to put in the fiber. The telecommunications provider will sell some of the fiber to Polk County Rural Public Power District. Being able to split ownership gives Polk County Rural Public Power District flexibility and security. The ISP and Polk County Rural Public Power District are also working on an application for a USDA Rural Utilities Service Grant.

Source: *Public Private Partnership Subcommittee meeting with Phil Burke & Barb Fowler, Polk County Public Power District on Feb. 20, 2019.*

Funding: Partners provide funding. USDA grant may provide additional funding.

Legal/Regulatory Barriers: None

Public Power Entities Sign Interlocal Agreement to Aggregate Demand and Facilitate Agreements with Telecommunications Providers

NPPD and local public power districts are exploring entering into an interlocal agreement to facilitate agreements with telecommunications providers and to aggregate their demand for telecommunications services. The sourcing effort would begin by talking to providers and then going through an RFP process. Network Nebraska could possibly act as a contracting agent. The consortium could also facilitate agreements between public power and telecommunications providers.

Source: *Public Private Partnership Subcommittee meeting with Dave Webb, NPPD & Kim Christiansen, Nebraska Rural Electric Association on Feb. 20, 2019.*

Funding: No additional funding required.

Legal/Regulatory Barriers: None

How Could Partnerships between Public Power and Telecommunications Providers Be Encouraged:

- Facilitating discussions between public power and telecommunications;
- Facilitating regional planning efforts including public power, telecommunications providers, local governments, economic development, education, health care, businesses and agricultural producers.

Public Power and Telecommunications Company Form a Joint Entity

Arkansas Rural Internet Service (ARIS). Ouachita Electric and South Arkansas Telephone jointly formed Arkansas Rural Internet Service (ARIS) to bring gigabit service to all 9,500 homes in Ouachita's service territory.

Nine Star Connect. Central Indiana Power and Hancock Telecom merged to form NineStar in 2011. Indiana law had to be amended to allow electric and telephone cooperatives to merge.

Source: *Kim Christiansen's presentation to Rural Broadband Task Force, Dec. 10, 2018*
https://ruralbroadband.nebraska.gov/meetings/task-force/2018Dec10presentations.pdf

Funding: Partners provide funding.

Legal/Regulatory Barriers: Undetermined

How Could This Model Be Incentivized: Undetermined

Telecommunications Provider Provides Services over Electric Fiber Network

Hendricks Power and Endeavor Communications, Indiana. Endeavor Communications is providing Gigabit-speed internet and telephone services over Hendricks Power's fiber optic network.

North Georgia Network Cooperative. North Georgia Network Cooperative received a BTOP grant in 2009 to build a regional fiber optic system with over 1,600 miles of fiber optic infrastructure. They partnered with Ellijay Telephone Cooperative for hosted telephony.

North Alabama Electric and New Hope Telephone Cooperative. North Alabama Electric received a $19,100,909 USDA Broadband Initiatives Program grant in 2011 to develop a fiber network. North Alabama Electric is partnering with New Hope Telephone to provide broadband to households, businesses, and anchor institutions in the area.

Lumbee River EMC, NC and Horry Telephone, SC. With $20 million in funding from USDA to install fiber, Lumbee River EMC installed a fiber network. A North Carolina law imposes restrictions on electric cooperative and USDA funding. In order to comply with the state law, Lumbee River EMC is leasing the system to Horry Telephone.

Source: *Kim Christiansen's presentation to Rural Broadband Task Force, Dec. 10, 2018*
https://ruralbroadband.nebraska.gov/meetings/task-force/2018Dec10presentations.pdf

Funding: Partners provide funding. Some electric providers utilized grant funding to build infrastructure.

Legal/Regulatory Barriers:

- Neb. Revised Statutes Section 86-577 places restrictions on leasing of dark fiber by public entities. Section 86-594 prohibits public entities which are not public power suppliers from providing retail or wholesale broadband or telecommunications services. Section 68-595 prohibits public power suppliers from providing retail telecommunications services.

How Could This Model Be Incentivized: Undetermined

Recommendations

- **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. Having a local or regional broadband manager or hiring a consultant can help facilitate the broadband planning and implementation. There are a number of broadband planning resources, including:
    - Becoming Broadband Ready Toolkit (Next Century Cities, 2019)*
    - Leveraging Broadband in Your Community: A Workbook to Help Communities Stimulate Broadband Development (Nebraska Broadband Initiative, 2014)
    - Intelligent Community Forum Self-Test and other resources from the Intelligent Community Forum*
- **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.

- **Remove barriers to public-private partnerships**. A couple of possible barriers have been identified by stakeholders. Neb. Revised Statutes Section 86-577 places restrictions on leasing of dark fiber by public entities. Public power providers have stated that this could be a barrier. Legislation clarifying communications as an approved use for private easements set up for telephone and electric use would also eliminate uncertainty and litigation over this issue.
- **Identify funding for public-private partnerships.** Possible funding sources for public-private partnerships include LB 840 funds, USDA broadband grants and loans, Community Reinvestment Act, and New Market Tax Credits. Additional sources of funding such as a state broadband grant program would facilitate the development of public-private partnerships. Approximately 25 states have created broadband grant funds.

**Resources developed by national and international organizations may include examples of municipalities and other public entities providing broadband which is legal in many states, but not Nebraska. These resources contain other material which may be helpful.*

Rural Broadband and Cooperatives

August 2019

By Gregory McKee

Cooperatives provide goods and services throughout the economy. Recent efforts to expand rural broadband access has led to questions about using the cooperative business model to provide broadband. This document explains what cooperatives are, how they have been used for broadband, discusses whether states can facilitate the use of cooperatives, and steps for starting rural broadband cooperatives.

What Is a Cooperative?

Cooperatives are user-owned and user-controlled businesses formed to benefit a group of members. Cooperatives have particular features.

1. **The users receive the benefits.** The group involved in the cooperative is usually the group that will benefit most from having the business in place. Users get the benefits of the business by using it. The benefits are distributed in proportion to use, not ownership.
2. **The users own the business.** The group involved with the cooperative provides equity. Additional capital may come from loans or grants.
3. **The users control the business.** The cooperative's users are ultimately responsible to set the direction for it. Users vote, democratically, to set major policies and to elect a board of directors composed of the cooperative's users. Users draw up bylaws to describe how the cooperative functions.

These features assure cooperatives provide a mutual benefit. Cooperatives are designed to reward use, encourage users to commit to using the business's services, and encourage users to voice opinions about how the business is doing.

Cooperatives Provide Rural Broadband

Cooperatives are being used around the United States to provide broadband service.

1. **Cooperatives deploy broadband.** Some telecommunications cooperatives have expanded their service offerings to include broadband. Electricity distribution cooperatives have expanded infrastructure to provide broadband services themselves, through a subsidiary, or through an affiliate business. Hundreds of business arrangements, each unique to the circumstances and needs of the users, among these cooperatives can be found.

2. **Cooperatives facilitate community organization for broadband service.** Less common than utility cooperative affiliations are cooperatives organized to facilitate broadband availability. Maryland Broadband Cooperative, Mid-Atlantic Broadband Cooperative, and Michigan Broadband Cooperative work with local partners to facilitate community broadband demand, leverage existing infrastructure, or help design partnerships among broadband access providers. These cooperatives may also provide shared administrative services for internet service providers.

The number of cooperatives performing these functions is growing. Requests for broadband access is often initially made by users of existing utility cooperatives.

Potential Role of State Governments to Facilitate Broadband Cooperatives Development

State governments may pursue a range of policies as broadband initiatives. These include efforts to use, finance, or provide broadband infrastructure.

1. **Policies on use.** State governments could use its leadership role to assess, stimulate or aggregate broadband demand. State resources could be used to educate about the benefits of broadband in rural communities. In Nebraska, the Rural Broadband Task Force has been created to investigate rural broadband availability and mechanisms whereby broadband access can be improved. These educational efforts may lead to community interest in forming cooperatives.
2. **Financial policies.** Governments could provide subsidies for broadband users or providers. These could be direct incentives, such as grants or tax credits. They could also be indirect, such as helping to plan or design networks or to provide equipment grants. Financial policies could be used to complement member equity to fund broadband network development.
3. **Policies for infrastructure development.** Governments could develop policies that affect provision of network infrastructure. In Nebraska this has included explicit permission to lease dark fiber, subject to certain restrictions. This permission could facilitate infrastructure partnerships between wholesale fiber capacity providers and cooperative internet service providers.

How to Get Started

Cooperatives begin when a large enough group agrees to solve an economic problem by creating their own business. Community members agree on an economic problem to solve and whether a cooperative is the right kind of business to do it. The group must study whether the benefits of starting a new business outweigh its risks. Prospective users of the business provide equity, pursue grants, and obtain financing to purchase sufficient assets to begin operations. Subsequent steps include incorporation, hiring professional staff, and forming a board of directors to oversee the business.

Resources for forming cooperatives are available through the Nebraska Cooperative Development Center (https://ncdc.unl.edu/).

Conclusion

Broadband access options are critical for obtaining a variety of services. Rural communities seek broadband access. Cooperatives, owned and controlled by their users, could be used to provide broadband services in rural areas. State governments could provide assistance to encourage broadband use and create incentives for infrastructure.

Additional Reading

1. "2015 NTCA Broadband Survey Report." (2016). National Telecommunications Cooperative Association. https://www.ntca.org/2015-ntca-broadband-survey-report
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3. Carlson, Scott and Christopher Mitchell. "RS Fiber: Fertile Fields for New Rural Internet Cooperative." (2016). Institute for Local Self-reliance. https://ilsr.org/wp-content/uploads/downloads/2016/05/RS-Fiber-Report-2016.pdf
4. Cody, Eric. "Electric Cooperatives Bring High-Speed Communications to Underserved Areas: Insights from NRECA's 2018 Twelve Broadband Case Studies." (2019). National Rural Electric Cooperative Association. https://www.cooperative.com/programs-services/bts/Documents/Reports/Report-Broadband-Case-Studies-Summary-March-2019.pdf
5. Grant, Alison, Wallace Tyner, and Larry DeBoer. "Estimation of the Net Benefits of Indiana Statewide Adoption of Rural Broadband." (2018). Perdue University Center for Regional Development. https://www.purdue.edu/newsroom/releases/2018/Q3/report-broadband-access-would-benefit-rural-areas,-state.html
6. Pitman, Lynn and Mary Kluz. "Cooperatives and Rural Broadband: A Selective Survey." (2017). University of Wisconsin Center for Cooperatives. https://resources.uwcc.wisc.edu/Utilities/CooperativesandBroadbandSurvey2017.pdf
7. Schmit, Todd, and Roberta Severson. "Exploring the Feasibility of a Rural Broadband Cooperative in Northern New York." *Extension Bulletin* 5 (2017). https://dyson.cornell.edu/wp-content/uploads/sites/5/2019/02/Cornell-Dyson-eb1705.pdf
8. "The Value of a Broadband Backbone for America's Electric Cooperatives: A Benefit Assessment Study". (2018). https://www.cooperative.com/topics/telecommunications-broadband/Pages/The-Value-of-a-Broadband-Backbone-for-Electric-Cooperatives.aspx

Broadband Resources for Nebraska Communities

Broadband Planning

Intelligent Community Extension Program – Asset-mapping approach to help rural communities or neighborhoods in urban areas to identify their assets to transition to a digital mindset.

> Intelligent Community Checklist for Rural Communities *
> https://pcrd.purdue.edu/checklist
>
> Other resources from the International Intelligent Community Forum*
> https://www.intelligentcommunity.org/
>
> *Members of the University of Nebraska Extension Community Vitality Initiative field or statewide staff may be able to facilitate broadband planning effort in your community. See* https://communityvitality.unl.edu/CVIDirectory *for a list of contacts.*

Leveraging Broadband in Your Community: A Workbook to Help Communities Stimulate Broadband Development (Nebraska Broadband Initiative, 2014)
http://broadband.nebraska.gov/workbook/html5/index.html

Becoming Broadband Ready Toolkit by Next Century Cities (2019)*
https://nextcenturycities.org/becoming-broadband-ready/

**Resources developed by national and international organizations may include examples of municipalities and other public entities providing broadband which is legal in many states, but not Nebraska.*

Community Broadband Success Stories

https://nitc.nebraska.gov/news/community/community.html

Cooperatives

Nebraska Cooperative Development Center
https://ncdc.unl.edu/

Contact Charlotte Narjes (cnarjes1@unl.edu, 402-472-1724) or Dr. Greg McKee (gmckee3@unl.edu, 402-472-2034) for more information.

Homework Gap and Library Broadband

Nebraska Library Commission Library Innovation Studios Grant
http://nlc.nebraska.gov/grants/InnovationStudios/

Nebraska Library Commission Sparks Grant—Nebraska Schools & Libraries: Breaking the Ice and Igniting Internet Relationships
http://nlc.nebraska.gov/grants/sparks/

*Contact Holly Woldt (*holly.woldt@nebraska.gov, 402-471-7980) *for information about strategies to improve library broadband, Christa Porter (christa.porter@nebraska.gov, 402-471-3107) for assistance with library E-Rate applications, and Tom Rolfes* (Tom.Rolfes@nebraska.gov, 402-471-7969) *for information on strategies to address the homework gap.*

Maps and Data

Nebraska Broadband Facts Infographic (PDF)
https://ruralbroadband.nebraska.gov/resources/facts/Broadband_Infographic.pdf

The **Nebraska Broadband Map** has information on broadband availability by speed tier and technology as well as information on areas eligible for funding from federal and state broadband programs.
https://broadbandmap.nebraska.gov
Click on the layers button in the bottom left corner to select layers.

The **FCC Broadband Map** has some good analytical capabilities.
https://broadbandmap.fcc.gov

Additional reports based on FCC Form 477 data are available from the 2018 FCC Communications Marketplace at https://docs.fcc.gov/public/attachments/FCC-18-181A9.pdf

Broadband Subscription Data by county can be found at the U.S. Census Bureau's American Fact Finder at https://factfinder.census.gov/
Use the Guided Search, Select Housing/Physical Characteristic/Internet Access (or Computer Availability); Select Geographic Area; Select Table. Use the 2017 ACS 5-year estimate if you want all counties in Nebraska.

Nebraska Broadband Surveys

Nebraska Rural Poll 2018 (PDF)
https://ruralpoll.unl.edu/pdf/18economicdev.pdf

Nebraska Digital Readiness Report 2018 (PDF)
https://agecon.unl.edu/research/DigitalReadinessReportNebraska2018.pdf

Broadband 101 & 102 Videos—2017 Nebraska Broadband Today! Conference

- Broadband 101: Broadband Technologies and Telecom Policy in Nebraska Videos
  - Broadband 101 Part 1: What is Broadband?
  - Broadband 101 Part 2: Bits, Bytes and Other Important Terms
  - Broadband 101 Part 3: Broadband Technologies—Overview and DSL
  - Broadband 101 Part 4: Broadband Technologies—Cable Modem
  - Broadband 101 Part 5: Broadband Technologies—Fiber
  - Broadband 101 Part 6: Broadband Technologies—Wireless and Satellite
  - Broadband 101 Part 7: Telecom Policy in Nebraska
- Broadband 102: Better Together: How Communities and Telecommunications Providers Can Work Together

Or search for "Broadband 101 OCIONebraska" or "Broadband 102 OCIONebraska."

Appendix 9
Broadband Adoption Data and Broadband in Nebraska Libraries

List of Tables and Figures

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Note: The percent population with broadband internet subscription from the U.S. Census Bureau 2017 American Community Survey 5-Year Estimate includes those who subscribe to cable, fiber optic, or DSL, satellite or a fixed wireless service as well as those who only use mobile broadband plans for internet access.

Table 1

Percent Population with Broadband Internet Subscription

Nebraska and Neighboring States

Geography	Percent Population With Broadband Internet Subscription
Colorado	87.0
Iowa	82.1
Kansas	82.5
Missouri	79.7
Nebraska	83.6
South Dakota	80.2
Wyoming	83.8

Source: U.S. Census Bureau 2017 American Community Survey 5-Year Estimate Data available at https://factfinder.census.gov/

Table 2

Percent Under 18 Years with Broadband Internet Subscription

Nebraska and Neighboring States

Geography	Percent Under 18 Years With Broadband Internet Subscription
Colorado	89.2
Iowa	87.9
Kansas	86.5
Missouri	83.9
Nebraska	88.1
South Dakota	84.0
Wyoming	88.1

Source: U.S. Census Bureau 2017 American Community Survey 5-Year Estimate Data available at https://factfinder.census.gov/

Table 3

Percent Population and Percent Under 18 Years with Broadband Internet Subscription

States Ranked by Percent with Broadband Internet Subscription

2017

Geography	Percent Population with Broadband Internet Subscription	Percent Under 18 Years with Broadband Internet Subscription
New Hampshire	88.6	92.7
Massachusetts	87.7	92.0
Washington	87.7	90.0
Utah	87.4	90.3
Colorado	87.0	89.2
Connecticut	86.8	91.7
New Jersey	86.5	89.3
Alaska	86.3	89.0
Maryland	86.3	89.1
Hawaii	86.1	90.0
Oregon	86.0	89.5
Minnesota	85.8	90.6
Rhode Island	85.3	90.3
California	85.2	85.9
Virginia	84.1	87.8
Wyoming	83.8	88.1
Nebraska	83.6	88.1
Vermont	83.5	88.8
Wisconsin	83.2	87.7
Illinois	83.1	87.0
New York	83.1	85.4
Delaware	82.9	84.8
Maine	82.9	88.8
Idaho	82.6	87.2
Nevada	82.6	84.0
North Dakota	82.6	88.1
Kansas	82.5	86.5
Pennsylvania	82.3	87.4
Iowa	82.1	87.9
Ohio	82.0	86.2
Arizona	81.8	82.6
Florida	81.7	83.9
Michigan	81.1	85.0
Montana	80.7	85.2
Georgia	80.3	82.8
South Dakota	80.2	84.0

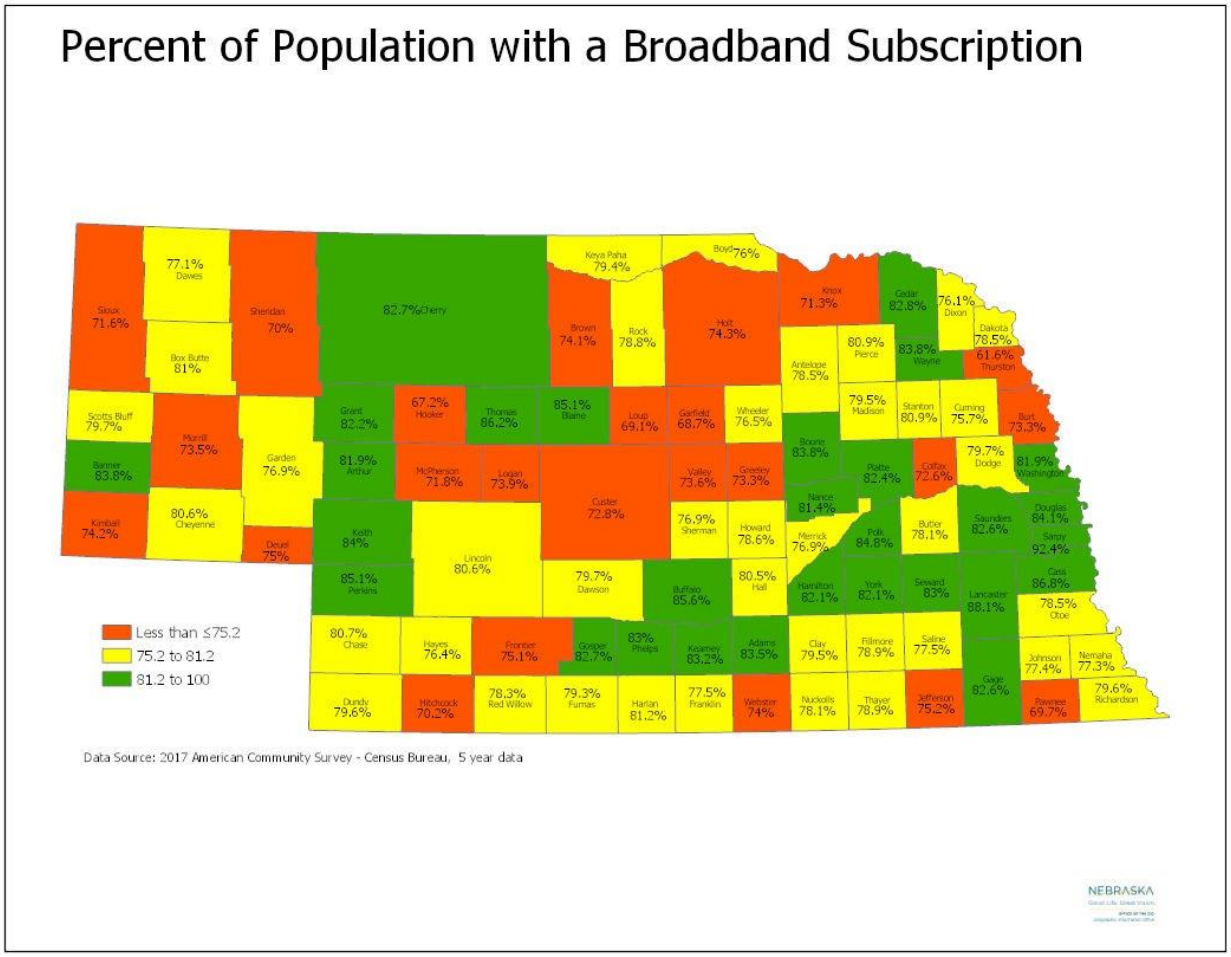
North Carolina	79.8	83.3
Geography	**Percent Population with Broadband Internet Subscription**	**Percent Under 18 Years with Broadband Internet Subscription**
Missouri	79.7	83.9
Indiana	79.6	82.8
Texas	79.2	79.9
District of Columbia	79.1	76.4
Kentucky	78.1	83.4
Oklahoma	77.0	80.3
Tennessee	76.9	80.8
South Carolina	76.7	80.6
West Virginia	76.5	84.4
Louisiana	75.1	79.0
Alabama	74.8	79.4
New Mexico	73.1	75.6
Arkansas	71.1	74.6
Mississippi	69.1	73.2
Puerto Rico	56.8	64.3

Source: U.S. Census Bureau 2017 American Community Survey 5-Year Data available at https://factfinder.census.gov/

Figure 1

Percent Population with Broadband Internet Subscription by Nebraska Counties

2017



Source: U.S. Census Bureau 2017 American Community Survey 5-Year Data available at https://factfinder.census.gov/

Table 4

Percent Population and Under 18 with Broadband Internet Subscription by County

Ranked by Population with Broadband Internet Subscription

2017

Geography	Percent Broadband Internet Subscription; Estimate; Total population in households	Margin of Error	Percent Broadband Internet Subscription; Estimate; AGE - Under 18 years	Margin of Error
Sarpy County, Nebraska	92.4	0.5	95.9	0.7
Lancaster County, Nebraska	88.1	0.7	91.1	1.3
Cass County, Nebraska	86.8	1.4	90.2	2.2
Thomas County, Nebraska	86.2	4.3	98.5	2.0
Buffalo County, Nebraska	85.6	1.5	91.7	2.1
Blaine County, Nebraska	85.1	6.2	91.5	10.7
Perkins County, Nebraska	85.1	4.7	88.6	9.5
Polk County, Nebraska	84.8	2.4	92.7	3.5
Douglas County, Nebraska	84.1	0.5	86.0	0.9
Keith County, Nebraska	84.0	2.7	96.4	2.1
Banner County, Nebraska	83.8	6.0	95.3	5.2
Boone County, Nebraska	83.8	2.6	93.5	4.6
Wayne County, Nebraska	83.8	3.7	89.9	6.0
Adams County, Nebraska	83.5	1.6	91.0	3.2
Kearney County, Nebraska	83.2	3.3	93.0	4.1
Phelps County, Nebraska	83.0	2.7	89.6	5.6
Seward County, Nebraska	83.0	2.1	89.5	3.1
Cedar County, Nebraska	82.8	1.9	93.8	2.8
Cherry County, Nebraska	82.7	3.7	92.8	4.1
Gosper County, Nebraska	82.7	3.7	93.7	5.2
Gage County, Nebraska	82.6	1.5	95.1	1.8
Saunders County, Nebraska	82.6	1.4	91.1	2.0
Platte County, Nebraska	82.4	1.8	90.2	2.9
Grant County, Nebraska	82.2	4.2	100.0	12.2
Hamilton County, Nebraska	82.1	3.3	83.1	6.5
York County, Nebraska	82.1	2.7	88.9	4.6
Arthur County, Nebraska	81.9	4.7	97.7	2.3
Washington County, Nebraska	81.9	3.3	81.0	7.9
Nance County, Nebraska	81.4	3.0	98.8	1.3
Harlan County, Nebraska	81.2	3.2	95.5	3.7
Box Butte County, Nebraska	81.0	4.0	83.9	7.4
Pierce County, Nebraska	80.9	2.7	91.3	4.4
Stanton County, Nebraska	80.9	3.2	89.8	4.9
Chase County, Nebraska	80.7	4.8	86.3	8.5

Geography	Percent Broadband Internet Subscription; Estimate; Total population in households	Margin of Error	Percent Broadband Internet Subscription; Estimate; AGE - Under 18 years	Margin of Error
Cheyenne County, Nebraska	80.6	2.7	88.6	4.4
Lincoln County, Nebraska	80.6	2.5	86.3	5.5
Hall County, Nebraska	80.5	1.9	83.1	3.6
Dawson County, Nebraska	79.7	2.4	86.9	3.5
Dodge County, Nebraska	79.7	2.2	83.1	4.1
Scotts Bluff County, Nebraska	79.7	2.1	86.1	3.7
Dundy County, Nebraska	79.6	5.0	82.3	12.6
Richardson County, Nebraska	79.6	3.0	93.7	4.6
Clay County, Nebraska	79.5	2.6	84.0	4.8
Madison County, Nebraska	79.5	1.7	87.7	2.9
Keya Paha County, Nebraska	79.4	5.1	84.8	10.6
Furnas County, Nebraska	79.3	3.0	90.2	5.5
Fillmore County, Nebraska	78.9	2.9	90.6	4.5
Thayer County, Nebraska	78.9	3.1	86.5	4.7
Rock County, Nebraska	78.8	4.3	97.4	3.1
Howard County, Nebraska	78.6	2.5	94.0	3.0
Antelope County, Nebraska	78.5	2.3	90.7	4.2
Dakota County, Nebraska	78.5	3.8	81.1	7.1
Otoe County, Nebraska	78.5	2.6	84.6	5.6
Red Willow County, Nebraska	78.3	3.8	85.8	7.5
Butler County, Nebraska	78.1	3.3	85.4	7.3
Nuckolls County, Nebraska	78.1	3.1	89.4	5.2
Franklin County, Nebraska	77.5	2.8	87.8	5.6
Saline County, Nebraska	77.5	4.4	86.7	4.8
Johnson County, Nebraska	77.4	3.6	91.6	5.7
Nemaha County, Nebraska	77.3	3.9	89.8	6.2
Dawes County, Nebraska	77.1	4.4	84.4	7.9
Garden County, Nebraska	76.9	5.7	88.8	8.3
Merrick County, Nebraska	76.9	3.7	90.0	4.2
Sherman County, Nebraska	76.9	3.6	89.5	5.8
Wheeler County, Nebraska	76.5	5.0	83.8	11.4
Hayes County, Nebraska	76.4	7.3	81.9	12.7
Dixon County, Nebraska	76.1	2.5	82.4	4.2
Boyd County, Nebraska	76.0	3.9	89.3	6.2
Cuming County, Nebraska	75.7	2.9	85.8	5.5
Jefferson County, Nebraska	75.2	3.7	84.5	7.4
Frontier County, Nebraska	75.1	3.8	89.7	5.8
Deuel County, Nebraska	75.0	5.0	83.3	6.7

Holt County, Nebraska	74.3	2.7	85.3	4.1
Geography	**Percent Broadband Internet Subscription; Estimate; Total population in households**	**Margin of Error**	**Percent Broadband Internet Subscription; Estimate; AGE - Under 18 years**	**Margin of Error**
Kimball County, Nebraska	74.2	6.1	80.1	10.9
Brown County, Nebraska	74.1	4.5	88.1	6.2
Webster County, Nebraska	74.0	4.0	82.0	8.0
Logan County, Nebraska	73.9	6.2	81.4	11.1
Valley County, Nebraska	73.6	4.2	85.5	6.2
Morrill County, Nebraska	73.5	4.8	74.7	10.0
Burt County, Nebraska	73.3	3.5	82.2	5.9
Greeley County, Nebraska	73.3	4.0	86.0	7.7
Custer County, Nebraska	72.8	3.6	83.6	6.0
Colfax County, Nebraska	72.6	4.8	74.3	10.0
McPherson County, Nebraska	71.8	9.5	92.8	8.2
Sioux County, Nebraska	71.6	8.3	75.3	19.1
Knox County, Nebraska	71.3	2.5	77.1	5.2
Hitchcock County, Nebraska	70.2	4.1	76.8	9.6
Sheridan County, Nebraska	70.0	4.6	77.1	9.6
Pawnee County, Nebraska	69.7	5.1	73.1	9.0
Loup County, Nebraska	69.1	8.6	67.3	17.2
Garfield County, Nebraska	68.7	5.7	80.8	10.7
Hooker County, Nebraska	67.2	8.4	71.8	18.6
Thurston County, Nebraska	61.6	2.7	60.4	3.9
Nebraska	83.6	0.3	86.4	0.3

Source: U.S. Census Bureau 2017 American Community Survey 5-Year Data available at https://factfinder.census.gov/

Table 5

Broadband in Nebraska Libraries

FY 2017-2018

Library Name	City	LSA Pop.	Max. Download Speed	LSA/ Speed Ratio	E-Rate
Arlington Public Library	Arlington	1,281	1.5 Mbps or less	854	No E-Rate
Arthur County Library	Arthur	457	1.5 Mbps or less	305	No E-Rate
Beaver Crossing Community Library	Beaver Crossing	409	1.5 Mbps or less	273	No E-Rate
Byron Public Library	Byron	80	1.5 Mbps or less	53	No E-Rate
Daykin Public Library	Daykin	158	1.5 Mbps or less	105	No E-Rate
Dwight Community Library	Dwight	195	1.5 Mbps or less	130	No E-Rate
Faith Memorial Library	Wallace	349	1.5 Mbps or less	233	No E-Rate
Louisville Public Library	Louisville	1,261	1.5 Mbps or less	841	No E-Rate
Mead Public Library	Mead	552	1.5 Mbps or less	368	No E-Rate
Virgil Biegert Public Library	Shickley	326	1.5 Mbps or less	217	No E-Rate
Bartley Public Library	Bartley	269	1.51 Mbps - 3.0 Mbps	90	No E-Rate
Brenizer Public Library	Merna	368	1.51 Mbps - 3.0 Mbps	123	1
Clarkson Public Library	Clarkson	631	1.51 Mbps - 3.0 Mbps	210	1
Davenport Public Library	Davenport	283	1.51 Mbps - 3.0 Mbps	94	No E-Rate
Exeter Public Library	Exeter	533	1.51 Mbps - 3.0 Mbps	178	No E-Rate
Greeley Village Public Library	Greeley	434	1.51 Mbps - 3.0 Mbps	145	No E-Rate
Harvard Public Library	Harvard	966	1.51 Mbps - 3.0 Mbps	322	No E-Rate
Hooper Public Library	Hooper	826	1.51 Mbps - 3.0 Mbps	275	No E-Rate
Indianola Public Library	Indianola	552	1.51 Mbps - 3.0 Mbps	184	No E-Rate
Jennifer Reinke Public Library	Deshler	739	1.51 Mbps - 3.0 Mbps	246	No E-Rate
Palisade Public Library	Palisade	340	1.51 Mbps - 3.0 Mbps	113	No E-Rate
Plymouth Public Library	Plymouth	386	1.51 Mbps - 3.0 Mbps	129	No E-Rate
Potter Public Library	Potter	320	1.51 Mbps - 3.0 Mbps	107	No E-Rate
Shelton Public Library	Shelton	1,061	1.51 Mbps - 3.0 Mbps	354	1
Sioux County Public Library	Harrison	1,203	1.51 Mbps - 3.0 Mbps	401	No E-Rate
Snyder Public Library	Snyder	291	1.51 Mbps - 3.0 Mbps	97	No E-Rate
Stratton Public Library	Stratton	333	1.51 Mbps - 3.0 Mbps	111	1
Struckman-Baatz Memorial Library	Western	234	1.51 Mbps - 3.0 Mbps	78	No E-Rate
Sutton Memorial Library	Sutton	1,429	1.51 Mbps - 3.0 Mbps	476	No E-Rate
Wauneta Public Library	Wauneta	574	1.51 Mbps - 3.0 Mbps	191	No E-Rate
Wisner Public Library	Wisner	1,180	1.51 Mbps - 3.0 Mbps	393	No E-Rate
Alice M. Farr Memorial Library	Aurora	4,488	3.1 Mbps - 6.0 Mbps	748	No E-Rate
Arcadia Township Library	Arcadia	389	3.1 Mbps - 6.0 Mbps	65	1
Broadwater Public Library	Broadwater	121	3.1 Mbps - 6.0 Mbps	20	No E-Rate
Creighton Public Library	Creighton	1,102	3.1 Mbps - 6.0 Mbps	184	1
Dakota City Public Library	Dakota City	1,860	3.1 Mbps - 6.0 Mbps	310	No E-Rate
Fairmont Public Library	Fairmont	531	3.1 Mbps - 6.0 Mbps	89	No E-Rate
Finch Memorial Library	Arnold	576	3.1 Mbps - 6.0 Mbps	96	No E-Rate
Garfield County Library	Burwell	2,016	3.1 Mbps - 6.0 Mbps	336	1
Gilbert Public Library	Friend	984	3.1 Mbps - 6.0 Mbps	164	No E-Rate
Hayes Center Public Library	Hayes Center	196	3.1 Mbps - 6.0 Mbps	33	1
Holdrege Area Public Library	Holdrege	9,060	3.1 Mbps - 6.0 Mbps	1510	1
Lied Lincoln Township Library	Wausa	744	3.1 Mbps - 6.0 Mbps	124	No E-Rate

Library Name	City	LSA Pop.	Max. Download Speed	LSA/ Speed Ratio	E-Rate
Lied Winside Public Library	Winside	415	3.1 Mbps - 6.0 Mbps	69	No E-Rate
Logan County Library	Stapleton	768	3.1 Mbps - 6.0 Mbps	128	1
Lois Johnson Memorial Library	Oakdale	297	3.1 Mbps - 6.0 Mbps	50	No E-Rate
Lyman Public Library	Lyman	331	3.1 Mbps - 6.0 Mbps	55	No E-Rate
Mitchell Public Library	Mitchell	1,660	3.1 Mbps - 6.0 Mbps	277	No E-Rate
Orchard Public Library	Orchard	350	3.1 Mbps - 6.0 Mbps	58	No E-Rate
Pilger Public Library	Pilger	365	3.1 Mbps - 6.0 Mbps	61	No E-Rate
Scotia Public Library & Heritage Center	Scotia	291	3.1 Mbps - 6.0 Mbps	49	1
Taylor Public Library	Taylor	609	3.1 Mbps - 6.0 Mbps	102	No E-Rate
Valparaiso Public Library	Valparaiso	544	3.1 Mbps - 6.0 Mbps	91	No E-Rate
Ainsworth Public Library	Ainsworth	1,649	6.1 Mbps - 12.0 Mbps	137	No E-Rate
Albion Public Library	Albion	1,613	6.1 Mbps - 12.0 Mbps	134	No E-Rate
Alliance Public Library	Alliance	8,164	6.1 Mbps - 12.0 Mbps	680	No E-Rate
Arapahoe Public Library	Arapahoe	992	6.1 Mbps - 12.0 Mbps	83	No E-Rate
Auld Public Library	Red Cloud	925	6.1 Mbps - 12.0 Mbps	77	No E-Rate
Bayard Public Library	Bayard	1,140	6.1 Mbps - 12.0 Mbps	95	1
Beatrice Public Library	Beatrice	12,295	6.1 Mbps - 12.0 Mbps	1025	No E-Rate
Beaver City Public Library	Beaver City	577	6.1 Mbps - 12.0 Mbps	48	No E-Rate
Bloomfield Public Library	Bloomfield	955	6.1 Mbps - 12.0 Mbps	80	No E-Rate
Bob & Wauneta Burkley Library	Dewitt	508	6.1 Mbps - 12.0 Mbps	42	No E-Rate
Bruning Public Library	Bruning	270	6.1 Mbps - 12.0 Mbps	23	No E-Rate
Brunswick Public Library	Brunswick	134	6.1 Mbps - 12.0 Mbps	11	No E-Rate
Bruun Memorial Library	Humboldt	813	6.1 Mbps - 12.0 Mbps	68	No E-Rate
Butler Memorial Library	Cambridge	1,040	6.1 Mbps - 12.0 Mbps	87	1
Ceresco Community Library	Ceresco	885	6.1 Mbps - 12.0 Mbps	74	No E-Rate
Chappell Memorial Library & Art Gallery	Chappell	900	6.1 Mbps - 12.0 Mbps	75	No E-Rate
Clearwater Public Library	Clearwater	405	6.1 Mbps - 12.0 Mbps	34	1
Culbertson Public Library	Culbertson	577	6.1 Mbps - 12.0 Mbps	48	1
Elgin Public Library	Elgin	622	6.1 Mbps - 12.0 Mbps	52	1
Elwood Public Library	Elwood	698	6.1 Mbps - 12.0 Mbps	58	No E-Rate
Emerson Public Library	Emerson	803	6.1 Mbps - 12.0 Mbps	67	No E-Rate
Fairfield Public Library	Fairfield	369	6.1 Mbps - 12.0 Mbps	31	No E-Rate
Franklin Public Library	Franklin	919	6.1 Mbps - 12.0 Mbps	77	No E-Rate
Gibbon Public Library	Gibbon	1,890	6.1 Mbps - 12.0 Mbps	158	No E-Rate
Gordon City Library	Gordon	1,545	6.1 Mbps - 12.0 Mbps	129	No E-Rate
Grant County Library	Hyannis	649	6.1 Mbps - 12.0 Mbps	54	No E-Rate
Hooker County Library	Mullen	674	6.1 Mbps - 12.0 Mbps	56	No E-Rate
Humphrey Public Library	Humphrey	806	6.1 Mbps - 12.0 Mbps	67	No E-Rate
Keya Paha County Library	Springview	793	6.1 Mbps - 12.0 Mbps	66	No E-Rate
Klyte Burt Memorial Library	Curtis	891	6.1 Mbps - 12.0 Mbps	74	No E-Rate
Lied Scottsbluff Public Library	Scottsbluff	14,874	6.1 Mbps - 12.0 Mbps	1240	No E-Rate
Lied Tekamah Public Library	Tekamah	1,723	6.1 Mbps - 12.0 Mbps	144	No E-Rate
Maxine White Sutherland Public Library	Sutherland	1,346	6.1 Mbps - 12.0 Mbps	112	1
McCook Public Library	Mccook	7,540	6.1 Mbps - 12.0 Mbps	628	No E-Rate
Meadow Grove Public Library	Meadow Grove	293	6.1 Mbps - 12.0 Mbps	24	No E-Rate
Minatare Public Library	Minatare	803	6.1 Mbps - 12.0 Mbps	67	No E-Rate
Nancy Fawcett Memorial Library	Lodgepole	301	6.1 Mbps - 12.0 Mbps	25	No E-Rate

Library Name	City	LSA Pop.	Max. Download Speed	LSA/ Speed Ratio	E-Rate
Newman Grove Public Library	Newman Grove	717	6.1 Mbps - 12.0 Mbps	60	No E-Rate
Niobrara Public Library	Niobrara	346	6.1 Mbps - 12.0 Mbps	29	No E-Rate
North Loup Township Library	North Loup	293	6.1 Mbps - 12.0 Mbps	24	1
Osceola Public Library	Osceola	865	6.1 Mbps - 12.0 Mbps	72	No E-Rate
Oshkosh Public Library	Oshkosh	814	6.1 Mbps - 12.0 Mbps	68	No E-Rate
Osmond Public Library	Osmond	749	6.1 Mbps - 12.0 Mbps	62	No E-Rate
Oxford Public Library	Oxford	754	6.1 Mbps - 12.0 Mbps	63	No E-Rate
Palmyra Memorial Library	Palmyra	563	6.1 Mbps - 12.0 Mbps	47	No E-Rate
Paxton Public Library	Paxton	497	6.1 Mbps - 12.0 Mbps	41	1
Polk Public Library	Polk	315	6.1 Mbps - 12.0 Mbps	26	1
Ponca Carnegie Library	Ponca	933	6.1 Mbps - 12.0 Mbps	78	No E-Rate
Rock County Public Library	Bassett	1,436	6.1 Mbps - 12.0 Mbps	120	No E-Rate
Seward Memorial Library	Seward	7,181	6.1 Mbps - 12.0 Mbps	598	1
Shelby Community Library	Shelby	707	6.1 Mbps - 12.0 Mbps	59	1
South Sioux City Public Library	South Sioux City	12,911	6.1 Mbps - 12.0 Mbps	1076	No E-Rate
Syracuse Public Library	Syracuse	1,985	6.1 Mbps - 12.0 Mbps	165	No E-Rate
Thomas County Library	Thedford	725	6.1 Mbps - 12.0 Mbps	60	No E-Rate
Valley Public Library	Valley	2,692	6.1 Mbps - 12.0 Mbps	224	No E-Rate
Webermeier Memorial Library	Milford	2,080	6.1 Mbps - 12.0 Mbps	173	No E-Rate
Wymore Public Library	Wymore	1,384	6.1 Mbps - 12.0 Mbps	115	No E-Rate
Yutan Public Library	Yutan	1,261	6.1 Mbps - 12.0 Mbps	105	No E-Rate
Bancroft Public Library	Bancroft	480	12.1 Mbps - 18.0 Mbps	27	No E-Rate
Cedar Rapids Public Library	Cedar Rapids	371	12.1 Mbps - 18.0 Mbps	21	No E-Rate
Clay Center Public Library	Clay Center	723	12.1 Mbps - 18.0 Mbps	40	1
Cordelia B. Preston Memorial Library	Orleans	481	12.1 Mbps - 18.0 Mbps	27	1
Ewing Township Library	Ewing	375	12.1 Mbps - 18.0 Mbps	21	No E-Rate
Fullerton Public Library	Fullerton	1,262	12.1 Mbps - 18.0 Mbps	70	No E-Rate
Gardner Public Library	Wakefield	1,395	12.1 Mbps - 18.0 Mbps	78	1
Hemingford Public Library	Hemingford	781	12.1 Mbps - 18.0 Mbps	43	No E-Rate
Hoesch Memorial Library	Alma	1,169	12.1 Mbps - 18.0 Mbps	65	No E-Rate
Kimball Public Library	Kimball	2,361	12.1 Mbps - 18.0 Mbps	131	No E-Rate
Lewellen Public Library	Lewellen	211	12.1 Mbps - 18.0 Mbps	12	No E-Rate
Milligan Public Library	Milligan	271	12.1 Mbps - 18.0 Mbps	15	No E-Rate
Nigel Sprouse Memorial Library	Callaway	1,200	12.1 Mbps - 18.0 Mbps	67	No E-Rate
O'Neill Public Library	O'neill	3,635	12.1 Mbps - 18.0 Mbps	202	No E-Rate
Rushville Public Library	Rushville	873	12.1 Mbps - 18.0 Mbps	49	No E-Rate
Sargent Township Library	Sargent	655	12.1 Mbps - 18.0 Mbps	36	1
Scribner Public Library	Scribner	821	12.1 Mbps - 18.0 Mbps	46	No E-Rate
Spalding Public Library	Spalding	448	12.1 Mbps - 18.0 Mbps	25	No E-Rate
Spencer Township Library	Spencer	612	12.1 Mbps - 18.0 Mbps	34	No E-Rate
Tecumseh Public Library	Tecumseh	1,640	12.1 Mbps - 18.0 Mbps	91	No E-Rate
Trenton Public Library	Trenton	550	12.1 Mbps - 18.0 Mbps	31	1
Walthill Public Library	Walthill	796	12.1 Mbps - 18.0 Mbps	44	1
Blue Hill Public Library	Blue Hill	870	18.1 Mbps - 24.0 Mbps	36	No E-Rate
Chadron Public Library	Chadron	5,648	18.1 Mbps - 24.0 Mbps	235	No E-Rate
Cravath Memorial Library	Hay Springs	545	18.1 Mbps - 24.0 Mbps	23	No E-Rate
Greenwood Public Library	Greenwood	586	18.1 Mbps - 24.0 Mbps	24	No E-Rate

Library Name	City	LSA Pop.	Max. Download Speed	LSA/ Speed Ratio	E-Rate
Hastings Memorial Library	Grant	1,120	18.1 Mbps - 24.0 Mbps	47	1
Howells Public Library	Howells	552	18.1 Mbps - 24.0 Mbps	23	No E-Rate
John Rogers Memorial Library	Dodge	597	18.1 Mbps - 24.0 Mbps	25	No E-Rate
Lied Imperial Public Library	Imperial	2,062	18.1 Mbps - 24.0 Mbps	86	1
Ord Township Library	Ord	2,446	18.1 Mbps - 24.0 Mbps	102	1
Saint Edward Public Library	St. Edward	681	18.1 Mbps - 24.0 Mbps	28	No E-Rate
Superior Public Library	Superior	1,862	18.1 Mbps - 24.0 Mbps	78	1
Verdigre Public Library	Verdigre	542	18.1 Mbps - 24.0 Mbps	23	1
Wilson Public Library	Cozad	3,815	18.1 Mbps - 24.0 Mbps	159	No E-Rate
Atkinson Public Library	Atkinson	1,251	24.1 Mbps - 50.0 Mbps	25	1
Baright Public Library	Ralston	10,462	24.1 Mbps - 50.0 Mbps	209	No E-Rate
Bellevue Public Library	Bellevue	53,424	24.1 Mbps - 50.0 Mbps	1068	No E-Rate
Bennington Public Library	Bennington	3,491	24.1 Mbps - 50.0 Mbps	70	No E-Rate
Blair Public Library	Blair	8,091	24.1 Mbps - 50.0 Mbps	162	No E-Rate
Broken Bow Public Library	Broken Bow	3,546	24.1 Mbps - 50.0 Mbps	71	No E-Rate
Central City Public Library	Central City	2,920	24.1 Mbps - 50.0 Mbps	58	1
Columbus Public Library	Columbus	33,175	24.1 Mbps - 50.0 Mbps	664	No E-Rate
Crawford Public Library	Crawford	953	24.1 Mbps - 50.0 Mbps	19	No E-Rate
Dundy County Library	Benkelman	1,801	24.1 Mbps - 50.0 Mbps	36	No E-Rate
Dvoracek Memorial Library	Wilber	1,878	24.1 Mbps - 50.0 Mbps	38	1
Elmwood Public Library	Elmwood	648	24.1 Mbps - 50.0 Mbps	13	No E-Rate
Fairbury Public Library	Fairbury	3,707	24.1 Mbps - 50.0 Mbps	74	1
Genoa Public Library	Genoa	956	24.1 Mbps - 50.0 Mbps	19	No E-Rate
Gering Public Library	Gering	8,319	24.1 Mbps - 50.0 Mbps	166	No E-Rate
Hartington Public Library	Hartington	1,490	24.1 Mbps - 50.0 Mbps	30	No E-Rate
Hebron Secrest Library	Hebron	1,511	24.1 Mbps - 50.0 Mbps	30	No E-Rate
House Memorial Library	Pender	1,100	24.1 Mbps - 50.0 Mbps	22	1
Jensen Memorial Library	Minden	2,973	24.1 Mbps - 50.0 Mbps	59	No E-Rate
Karlen Memorial Library	Beemer	662	24.1 Mbps - 50.0 Mbps	13	No E-Rate
Keene Memorial Library	Fremont	26,773	24.1 Mbps - 50.0 Mbps	535	No E-Rate
Leigh Public Library	Leigh	412	24.1 Mbps - 50.0 Mbps	8	No E-Rate
Lied Pierce Public Library	Pierce	1,729	24.1 Mbps - 50.0 Mbps	35	No E-Rate
Morrill Public Library	Morrill	908	24.1 Mbps - 50.0 Mbps	18	No E-Rate
Neligh Public Library	Neligh	1,516	24.1 Mbps - 50.0 Mbps	30	1
North Bend Public Library	North Bend	1,256	24.1 Mbps - 50.0 Mbps	25	1
Oakland Public Library	Oakland	1,183	24.1 Mbps - 50.0 Mbps	24	1
Pawnee City Public Library	Pawnee City	824	24.1 Mbps - 50.0 Mbps	16	1
Schuyler Public Library	Schuyler	6,212	24.1 Mbps - 50.0 Mbps	124	1
Springfield Memorial Library	Springfield	1,603	24.1 Mbps - 50.0 Mbps	32	1
Stanton Public Library	Stanton	1,522	24.1 Mbps - 50.0 Mbps	30	No E-Rate
Ulysses Township Library	Ulysses	305	24.1 Mbps - 50.0 Mbps	6	No E-Rate
Agnes Robinson Waterloo Public Library	Waterloo	1,362	50.1 Mbps - 100.0 Mbps	14	No E-Rate
Ashland Public Library	Ashland	2,570	50.1 Mbps - 100.0 Mbps	26	No E-Rate
Auburn Memorial Library	Auburn	3,302	50.1 Mbps - 100.0 Mbps	33	No E-Rate
Axtell Public Library	Axtell	906	50.1 Mbps - 100.0 Mbps	9	No E-Rate
Bridgeport Public Library	Bridgeport	1,520	50.1 Mbps - 100.0 Mbps	15	No E-Rate
Crete Public Library	Crete	7,160	50.1 Mbps - 100.0 Mbps	72	No E-Rate

Library Name	City	LSA Pop.	Max. Download Speed	LSA/ Speed Ratio	Library Name
Eastern Township Library	Crofton	677	50.1 Mbps - 100.0 Mbps	7	No E-Rate
Geneva Public Library	Geneva	2,122	50.1 Mbps - 100.0 Mbps	21	No E-Rate
Gothenburg Public Library	Gothenburg	3,472	50.1 Mbps - 100.0 Mbps	35	No E-Rate
Gretna Public Library	Gretna	5,062	50.1 Mbps - 100.0 Mbps	51	No E-Rate
Hildreth Public Library	Hildreth	352	50.1 Mbps - 100.0 Mbps	4	No E-Rate
Hruska Memorial Public Library	David City	2,823	50.1 Mbps - 100.0 Mbps	28	No E-Rate
Kearney Public Library	Kearney	33,835	50.1 Mbps - 100.0 Mbps	338	1
Kilgore Memorial Library	York	7,862	50.1 Mbps - 100.0 Mbps	79	1
Laurel Community Learning Center	Laurel	927	50.1 Mbps - 100.0 Mbps	9	No E-Rate
Lied Battle Creek Public Library	Battle Creek	1,201	50.1 Mbps - 100.0 Mbps	12	No E-Rate
Lied Randolph Public Library	Randolph	912	50.1 Mbps - 100.0 Mbps	9	No E-Rate
Lyons Public Library	Lyons	805	50.1 Mbps - 100.0 Mbps	8	1
Maltman Memorial Public Library	Wood River	1,350	50.1 Mbps - 100.0 Mbps	14	No E-Rate
Morton-James Public Library	Nebraska City	7,313	50.1 Mbps - 100.0 Mbps	73	No E-Rate
Nelson Public Library	Nelson	459	50.1 Mbps - 100.0 Mbps	5	No E-Rate
Norfolk Public Library	Norfolk	24,434	50.1 Mbps - 100.0 Mbps	244	No E-Rate
North Platte Public Library	North Platte	35,280	50.1 Mbps - 100.0 Mbps	353	No E-Rate
Plainview Public Library	Plainview	1,196	50.1 Mbps - 100.0 Mbps	12	No E-Rate
Plattsmouth Public Library	Plattsmouth	6,451	50.1 Mbps - 100.0 Mbps	65	No E-Rate
Raymond A. Whitwer Tilden Pub. Lib.	Tilden	932	50.1 Mbps - 100.0 Mbps	9	1
Saint Paul Public Library	St. Paul	2,342	50.1 Mbps - 100.0 Mbps	23	No E-Rate
Sidney Public Library	Sidney	9,676	50.1 Mbps - 100.0 Mbps	97	1
Stromsburg Public Library	Stromsburg	1,158	50.1 Mbps - 100.0 Mbps	12	1
Sump Memorial Library	Papillion	19,539	50.1 Mbps - 100.0 Mbps	195	No E-Rate
Wahoo Public Library	Wahoo	4,471	50.1 Mbps - 100.0 Mbps	45	No E-Rate
Weeping Water Public Library	Weeping Water	1,078	50.1 Mbps - 100.0 Mbps	11	No E-Rate
Falls City Library and Arts Center	Falls City	4,187	100.0 Mbps - 1 Gbps	4	1
Goodall City Library	Ogallala	4,538	100.0 Mbps - 1 Gbps	5	No E-Rate
Grand Island Public Library	Grand Island	51,390	100.0 Mbps - 1 Gbps	51	1
Hastings Public Library	Hastings	31,678	100.0 Mbps - 1 Gbps	32	1
John A. Stahl Library	West Point	3,340	100.0 Mbps - 1 Gbps	3	1
Lexington Public Library	Lexington	10,024	100.0 Mbps - 1 Gbps	10	1
Lincoln City Libraries	Lincoln	314,354	100.0 Mbps - 1 Gbps	314	No E-Rate
Loup City Library	Loup City	3,086	100.0 Mbps - 1 Gbps	3	No E-Rate
Madison Public Library	Madison	2,359	100.0 Mbps - 1 Gbps	2	1
Omaha Public Library	Omaha	543,614	100.0 Mbps - 1 Gbps	544	1
Ravenna Public Library	Ravenna	1,373	100.0 Mbps - 1 Gbps	1	No E-Rate
Valentine Public Library	Valentine	5,818	100.0 Mbps - 1 Gbps	6	1
Wayne Public Library	Wayne	5,494	100.0 Mbps - 1 Gbps	5	No E-Rate
La Vista Public Library	La Vista	17,116	Over 1 Gbps	17	No E-Rate

Source: Nebraska Library Commission

Note: Not all Nebraska libraries provided data to the Nebraska Library Commission

For an interactive map, see https://www.zeemaps.com/view?group=3499369&x=-100.053561&y=43.439597&z=11

Table 6

E-rate Funding for Nebraska Libraries

2019

FRN Status	Billed Entity Name	Discount	E-rate Funding Request	Estimated Annual Cost	Estimated Monthly Cost	FRN Service Type
Pending	Arcadia Township Library	80%	$451.49	$564.36	$47.03	Data Transmission/Internet Access
Funded	Atkinson Public Library	70%	$3,024.00	$4,320.00	$360.00	Data Transmission/Internet Access
Funded	Bayard Public Library	80%	$479.81	$599.76	$49.98	Data Transmission/Internet Access
Pending	Brenizer Public Library	70%	$594.22	$848.89	$70.74	Data Transmission/Internet Access
Funded	Butler Memorial Library	70%	$1,133.92	$1,619.89	$134.99	Data Transmission/Internet Access
Funded	C.B. Preston Memorial Library	80%	$700.90	$876.13	$73.01	Data Transmission/Internet Access
Funded	Central City Public Library	70%	$1,344.00	$1,920.00	$160.00	Data Transmission/Internet Access
Funded	Clarks Public Library	70%	$1,137.02	$1,624.31	$135.36	Data Transmission/Internet Access
Pending	Clarkson Public Library	60%	$1,396.80	$2,328.00	$194.00	Data Transmission/Internet Access
Pending	Clay Center Public Library	80%	$960.00	$1,200.00	$100.00	Data Transmission/Internet Access
Funded	Clearwater Public Library	70%	$881.58	$1,259.40	$104.95	Data Transmission/Internet Access
Funded	Creighton Public Library	70%	$981.62	$1,402.31	$116.86	Data Transmission/Internet Access
Funded	Culbertson Public Library	80%	$896.93	$1,121.16	$93.43	Data Transmission/Internet Access
Funded	Dvoracek Memorial Library	60%	$1,008.00	$1,680.00	$140.00	Data Transmission/Internet Access
Pending	Elgin Public Library	70%	$629.92	$899.89	$74.99	Data Transmission/Internet Access
Funded	Fairbury Public Library	80%	$751.01	$938.76	$78.23	Data Transmission/Internet Access
Pending	Gardner Public Library	80%	$767.52	$959.40	$79.95	Data Transmission/Internet Access
Funded	Garfield County Library	70%	$839.58	$1,199.40	$99.95	Data Transmission/Internet Access
Funded	Grand Island Public Library	80%	$4,620.29	$5,775.36	$481.28	Data Transmission/Internet Access
Pending	Hastings Memorial Library	70%	$1,595.58	$2,279.40	$189.95	Data Transmission/Internet Access
Funded	Hastings Public Library	80%	$19,582.40	$24,478.00	$2,039.83	Data Transmission/Internet Access
Funded	Hayes Center Public Library	70%	$630.00	$900.00	$75.00	Data Transmission/Internet Access
Funded	Holdrege Public Library System	70%	$1,185.91	$1,694.16	$141.18	Data Transmission/Internet Access
Funded	House Memorial Library	70%	$1,260.00	$1,800.00	$150.00	Data Transmission/Internet Access
Funded	Imperial Public Library	70%	$2,513.83	$3,591.19	$299.27	Data Transmission/Internet Access
Funded	John A Stahl Library	80%	$8,640.00	$10,800.00	$900.00	Data Transmission/Internet Access
Funded	Kearney Public Library	60%	$1,367.93	$2,279.88	$189.99	Data Transmission/Internet Access
Funded	Lexington Public Library	90%	$1,620.00	$1,800.00	$150.00	Data Transmission/Internet Access
Pending	Logan County Library	60%	$518.40	$864.00	$72.00	Data Transmission/Internet Access
Funded	Lyons Public Library	80%	$1,920.00	$2,400.00	$200.00	Data Transmission/Internet Access
Funded	Madison Public Library	80%	$2,347.78	$2,934.73	$244.56	Data Transmission/Internet Access
Funded	Neligh Public Library	70%	$756.00	$1,080.00	$90.00	Data Transmission/Internet Access
Funded	North Bend Public Library	60%	$958.68	$1,597.80	$133.15	Data Transmission/Internet Access
Funded	North Loup Public Library	80%	$671.52	$839.40	$69.95	Data Transmission/Internet Access
Funded	Oakland Public Library	70%	$2,940.00	$4,200.00	$350.00	Data Transmission/Internet Access
Funded	Omaha Public Library - City Of Omaha	80%	$80,064.00	$100,080.00	$8,340.00	Data Transmission/Internet Access

FRN Status	Billed Entity Name	Discount	E-rate Funding Request	Estimated Annual Cost	Estimated Monthly Cost	FRN Service Type
Funded	Ord Township Library	70%	$587.83	$839.76	$69.98	Data Transmission/Internet Access
Funded	Pawnee City Public Library	80%	$2,252.93	$2,816.16	$234.68	Data Transmission/Internet Access
Denied	Paxton Public Library	70%	$1,145.42	$1,636.31	$136.36	Data Transmission/Internet Access
Funded	Polk Public Library	70%	$210.00	$300.00	$25.00	Data Transmission/Internet Access
Funded	Rising City Community Library	70%	$900.48	$1,286.40	$107.20	Data Transmission/Internet Access
Funded	Sargent Township Library	80%	$575.52	$719.40	$59.95	Data Transmission/Internet Access
Funded	Schuyler Public Library	80%	$3,840.00	$4,800.00	$400.00	Data Transmission/Internet Access
Funded	Scotia Public Library	80%	$575.52	$719.40	$59.95	Data Transmission/Internet Access
Funded	Seward Public Library	60%	$1,728.00	$2,880.00	$240.00	Data Transmission/Internet Access
Funded	Shelby Community Library	70%	$923.92	$1,319.89	$109.99	Data Transmission/Internet Access
Funded	Shelton Public Library	70%	$236.21	$337.44	$28.12	Data Transmission/Internet Access
Funded	Sidney Public Library	70%	$1,008.00	$1,440.00	$120.00	Data Transmission/Internet Access
Funded	Southeast Library System	60%	$510.48	$850.80	$70.90	Data Transmission/Internet Access
Pending	Springfield Memorial Library	50%	$330.00	$660.00	$55.00	Data Transmission/Internet Access
Funded	Stratton Public Library	80%	$978.62	$1,223.28	$101.94	Data Transmission/Internet Access
Funded	Stromsburg Public Library	60%	$575.86	$959.77	$79.98	Data Transmission/Internet Access
Funded	Superior Public Library	70%	$755.58	$1,079.40	$89.95	Data Transmission/Internet Access
Funded	Sutherland Public Library	60%	$1,408.03	$2,346.72	$195.56	Data Transmission/Internet Access
Funded	Three Rivers Library System	80%	$1,539.20	$1,924.00	$160.33	Data Transmission/Internet Access
Funded	Tilden Public Library	60%	$863.86	$1,439.77	$119.98	Data Transmission/Internet Access
Funded	Trenton Public Library	80%	$834.72	$1,043.40	$86.95	Data Transmission/Internet Access
Funded	Valentine Public Library	70%	$840.00	$1,200.00	$100.00	Data Transmission/Internet Access
Funded	Verdigre Public Library	70%	$973.64	$1,390.91	$115.91	Data Transmission/Internet Access
Funded	Walthill Public Library	90%	$339.77	$377.52	$31.46	Data Transmission/Internet Access
Funded	Western Library System	80%	$528.00	$660.00	$55.00	Data Transmission/Internet Access
Funded	York Public Library	70%	$1,847.83	$2,639.76	$219.98	Data Transmission/Internet Access
TOTALS			**$177,480.06**	**$231,645.66**		
Pending	Lyons Public Library	80%	$2,400.00	$3,000.00		Internal Connections Maintenance
Pending	Lyons Public Library	80%	$3,165.60	$3,957.00		Internal Connections Maintenance
Pending	North Bend Public Library	60%	$1,228.20	$2,047.00		Internal Connections Maintenance
Funded	Atkinson Public Library	70%	$848.93	$1,212.76		Internal Connections
Funded	Grand Island Public Library	80%	$9,611.60	$12,014.50		Internal Connections
Funded	Imperial Public Library	70%	$608.65	$869.50		Internal Connections
Pending	John A Stahl Library	80%	$57.60	$72.00		Internal Connections
Pending	John A Stahl Library	80%	$1,276.80	$1,596.00		Internal Connections
Pending	John A Stahl Library	80%	$4,940.00	$6,175.00		Internal Connections
Pending	John A Stahl Library	80%	$384.00	$480.00		Internal Connections
Pending	John A Stahl Library	80%	$1,660.80	$2,076.00		Internal Connections
Pending	John A Stahl Library	80%	$2,512.00	$3,140.00		Internal Connections
Pending	John A Stahl Library	80%	$85.12	$106.40		Internal Connections

FRN Status	Billed Entity Name	Discount	E-rate Funding Request	Estimated Annual Cost	Estimated Monthly Cost	FRN Service Type
Pending	John A Stahl Library	80%	$1,560.00	$1,950.00		Internal Connections
Pending	John A Stahl Library	80%	$340.00	$425.00		Internal Connections
Pending	Oakland Public Library	70%	$245.00	$350.00		Internal Connections
TOTALS			**$30,924.30**	**$39,471.16**		

FCC's Additional Discount to Match State Funding for Special Construction

Background: (https://www.usac.org/sl/applicants/beforeyoubegin/state-matching-provision.aspx)

If a state provides eligible schools and libraries with funding for special construction charges for high-speed broadband that meets the FCC's long-term connectivity targets, the E-rate Program will increase an applicant's discount rate for these charges up to an additional 10 percent to match the state funding on a one-to-one dollar basis. Total E-rate support with matching funds may not exceed 100 percent. (Current states' participation includes: AZ, CA, CO, FL, ID, IL, IN, KS, MA, MD, ME, MI, MO, MT, NV, NC, NH, NM, NY, OK, TX, VA, WA, WI)

For most schools and libraries, the E-rate Program will only match funding for special construction projects if the source of the funding is the state (i.e., funding authorized directly by a state legislature or one or more state agencies).

In all cases, E-rate matching funds will only be approved if the special construction project will provide high-speed broadband connections that meet the FCC's connectivity targets **(e.g. 100Mbps for public libraries under 50,000 LSA & 1Mbps per student in public schools)** adopted in the E-rate Modernization Order, and may not be applied to any other cost.

Applicants seeking additional E-rate discounts to match state funding for special construction must submit information with their FCC Form 471 filing that USAC will use to determine:

1. Whether the state funding is from an eligible source;
2. That any terms and conditions associated with the state funding are not in conflict with E-rate rules;
3. The appropriate calculation of the additional E-rate discount, if any; and
4. Whether the project meets the Commission's connectivity targets.

What is "Special Construction"? (https://www.usac.org/sl/applicants/beforeyoubegin/fiber.aspx)

For the purposes of the E-rate Program, special construction charges are the upfront, non-recurring costs of deploying new fiber or upgraded facilities to E-rate eligible entities. Special construction consists of three components:

1. Construction of network facilities
2. Design and engineering
3. Project management

Special construction does not include charges for Network Equipment, i.e., modulating electronics and other equipment necessary to make a Category One service functional. (A Category 1 service involves telecom circuits and internet)

An applicant may not receive E-rate support for recurring charges for leased lit fiber or leased dark fiber until the fiber is lit. Additionally an applicant may not receive E-rate support for special construction related to leased lit fiber or leased dark fiber if the fiber is not lit by the end of the funding year (i.e., June 30). Similarly, applicants may only receive E-rate support for a self-provisioned network if the network is constructed and is in use within the funding year.

Requesting Funding Before July 1 in any E-rate Funding Year

Program rules permit applicants to request E-rate discounts for special construction charges incurred up to six months prior to the July 1 start of the funding year (i.e., on or after January 1), provided that:

1. Construction begins after selection of a service provider pursuant to a valid competitive bidding process;
2. A Category One recurring service depends on the installation of the infrastructure; and

3. The service start date is on or after the start of the funding year.

Applicants that choose to start special construction prior to receiving a Funding Commitment Decision Letter (FCDL) approving a special construction funding request, assume the risk that the funding request may be denied or reduced.

Why is this important to rural Nebraska?

Using rural public libraries as anchor tenants, matching funds for special construction may stimulate new fiber construction within rural communities. This new fiber construction may benefit area businesses, wireless internet providers, and additional anchor institutions by providing advanced broadband services to the entities' doorstep that are in the pathway of the new fiber. While the public library circuits may be contracted as either fiber Ethernet transport to Network Nebraska or internet + transport from the Internet Service Provider, other entities in the fiber pathway that are ineligible for Network Nebraska may also contract for Internet + transport with the fiber provider. This strategy makes use of the "dig once, serve many" approach to fiber construction.

Projected Timeline of the Nebraska Special Construction Matching Funds Initiative:

October 18, 2019	Rural Broadband Task Force (RBTF) finalizes recommendations and report
November 1, 2019	RBTF Report is presented to the Governor and the Legislature
November XX, 2019 recommendations	The Legislature convenes an interim study hearing to review the
December XX, 2019	Public Service Commission opens a Proceeding to explore the Special Construction Matching Funds program
January 8-24, 2020	Bill Introduction in the Legislature
January XX, 2020	Public Service Commission conducts a "Workshop" to discuss the Special Construction Matching Funds program with interested parties
February XX, 2020	Public Service Commission conducts a Hearing to receive testimony about the Special Construction Matching Funds program
April XX, 2020	Public Service Commission deadline for Comment submission concerning the Special Construction Matching Funds program
May XX, 2020	Public Service Commission Approves or Disapproves of the Special Construction Matching Funds program
June-July, 2020	Public Service Commission issues Rules, Priorities, and Procedures concerning the Special Construction Matching Funds program
September 1, 2020	State Purchasing Bureau releases an RFP that includes PHASE 1 of the public library fiber circuit requests
November 6, 2020	State Purchasing Bureau opens bids on the RFP
November, 2020	Bid evaluation and Intents to Award are disclosed; 4-year contracts are signed
December, 2020	Libraries decide whether to move ahead with their fiber circuits and apply for Special Construction Matching Funds
January, 2021	Public Service Commission notifies public libraries of matching funds decision

February, 2021	E-rate Category 1 Applications are submitted and Work Orders are sent to Providers
June 30, 2021	Fiber construction is completed
July 1, 2021	Service Start Date for new fiber circuits

(Repeatable Sequence = GRAY HIGHLIGHTS)

July 1, 2021	PHASE 1 Public Libraries become new members of Network Nebraska
July 1, 2022	PHASE 2 Public Libraries become new members of Network Nebraska
July 1, 2023	PHASE 3 Public Libraries become new members of Network Nebraska
July 1, 2024	PHASE 4 Public Libraries become new members of Network Nebraska

2019-20 E-rate Discounts

Applicants	Annual Category 1 Expenditures Ave Discount	Annual Category 1 Reimbursement
62 Public Libraries	$ 231,646 72%	$ 177,480
355 K-12 Applications	$9,310,562 68%	$6,331,182
417 Applications	$9,542,208 70%	$6,508,662

Estimate of Nebraska Public Libraries without Fiber Access

As of the 2018 self-reported data collection, the Nebraska Library Commission reported 43 of 248, or approximately 16% of the public libraries under 10,000 Legal Service Area (LSA) reported “Fiber Optics” as their primary internet connection. Of the public libraries with LSAs less than 2,500 people, only 22 of 196 libraries, or approximately 11% reported “Fiber Optics” as their primary internet connection. This would indicate that 89% or 174 of the 196 public libraries do NOT have scalable fiber as their primary internet connection.

Potential Fiscal Impact of the Special Construction Matching Fund Program

The Special Construction Matching Fund program would stimulate additional economic benefit of $2.2 - $4 million in fiber construction and also increase the amount of E-rate funding to Nebraska public libraries by $800,000 per year, and create high bandwidth Wi-Fi demonstration sites in all of the public libraries.

USAC Funding Example

For example, a public library with a 70 percent discount rate applies for E-rate discounts for special construction charges of $25,000 associated with a leased lit Ethernet circuit to Network Nebraska. The state provides additional funding for 10 percent of the special construction costs ($2,500). The E-rate Program will match that state funding on a one-to-one dollar basis, adding 10 percent to the library's E-rate Program discount ($2,500).

The result is that the out-of-pocket cost for the public library is reduced from $7,500 (30%) to $2,500 (10%) because the state is providing $2,500 (10% state funding) and the E-rate Program is providing $20,000 (70% E-rate discount + 10% E-rate matching funds).

Estimated Program Costs for Libraries under 2,500 Legal Service Area (population)

Using an extrapolation methodology of every public library under 2,500 LSA seeking fiber construction within four years, that would translate to about 44 libraries per year, if broken up into four phases of participation. If the average special construction cost for each library would be $25,000, the total build cost for each phase of 44 libraries would equal $1,100,000. The state's 10% matching share of the $1,100,000 would be $110,000 for each of the four years of the program. The FCC's additional match would also be $110,000 per year for each of the four years of the program. This scenario would be termed the **"*Maximum Implicated Costs*".**

Participants (Yrs 1-4)	Ave Build Cost	Total	State (10%)	FCC (10%)	E-rate (70%)
Libraries(~10%)	44 public libraries	$25,000	$1.1M	$110,000	$110,000
$770,000	$110,000				
44 public libraries	$25,000	$1.1M	$110,000	$110,000	$770,000
$110,000					
44 public libraries	$25,000	$1.1M	$110,000	$110,000	$770,000
$110,000					
44 public libraries	$25,000	$1.1M	$110,000	$110,000	$770,000
$110,000					
176 libraries over 4 years		$4.4M	$440,000	$440,000	$3.08M
$440,000					

Since not every community and every public library under 2,500 LSA will be interested in participating in the Special Construction Matching Funds program, or able to sustain the ongoing costs of fiber, a smaller number of libraries would likely participate. Sources suggest that this participation rate would hover around 50% of the 44 targeted libraries per year, or around 22 public libraries per year. By reducing the participation rate to 50% of the total eligible, the State of Nebraska matching funds would be about $55,000 per year, or $220,000 over four years. This scenario would be termed , the "***Practical Implicated Costs***".

Participants (Yrs 1-4)	Ave Build Cost	Total	State (10%)	FCC (10%)	E-rate (70%)
Libraries(~10%)	22 public libraries	$25,000	$550K	$ 55,000	$
55,000 $385,000	$ 55,000				
22 public libraries	$25,000	$550K	$ 55,000	$ 55,000	$385,000
$ 55,000					
22 public libraries	$25,000	$550K	$ 55,000	$ 55,000	$385,000
$ 55,000					
22 public libraries	$25,000	$550K	$ 55,000	$ 55,000	$385,000
$ 55,000					
88 libraries over 4 years		$2.2M	$220,000	$220,000	$1.54M
$220,000					

Assumptions

It is assumed that this new fiber construction would benefit rural communities by offering a fiber-based internet service to businesses, wireless internet providers, and additional community anchor institutions. It is assumed that front-loaded special construction funding would take advantage of 'time value of money' and allow telecommunications providers to recover their capital construction costs more quickly, and thereby reduce the monthly recurring costs for public libraries. It is assumed that this program would be targeted to smaller LSAs under 2,500 population, but that additional benefits could befall public libraries without fiber in the 2,500 to 10,000 LSA range, if allowed to participate.

Table 7

2016 Federal Universal Service Fund Disbursements

Nebraska and Neighboring States

State	Pop.	High Cost	High Cost Per Capita	Low Income	Low Income Per Capita	Schools Libraries	School& Lib. Per Capita	Rural Health	Rural Health Per Capita	Total USF	Total Per Capita
Colorado	5,607,154	59,392,000	10.59	9,756,000	1.74	21,769,000	3.88	4,869,000	0.87	95,786,000	17.08
Iowa	3,145,711	179,571,000	57.08	7,021,000	2.23	15,606,000	4.96	2,511,000	0.80	204,710,000	65.08
Kansas	2,913,123	169,021,000	58.02	6,664,000	2.29	21,467,000	7.37	3,780,000	1.30	200,932,000	68.97
Missouri	6,113,532	164,861,000	26.97	15,734,000	2.57	46,736,000	7.64	5,500,000	0.90	232,831,000	38.08
Nebraska	1,920,076	90,655,000	47.21	899,000	0.47	11,957,000	6.23	3,455,000	1.80	106,966,000	55.71
South Dakota	869,666	98,757,000	113.56	1,138,000	1.31	5,749,000	6.61	1,602,000	1.84	107,246,000	123.32
Wyoming	579,315	43,211,000	74.59	88,000	0.15	6,528,000	11.27	403,000	0.70	50,230,000	86.71

Universal Service Monitoring Report 2017 https://docs.fcc.gov/public/attachments/DOC-350207A1.pdf

Appendix 10
Nebraska Homework Gap Survey Results

Survey Gauges Impact of Homework Gap on Students, Teachers

In order to better gauge the impact of the homework gap on teachers and students in Nebraska, a survey was disseminated via e-mail to 21,443 Nebraska teachers July 2019. Nearly 7,000 (6,919) teachers responded for a response rate of 32%.

The survey found:

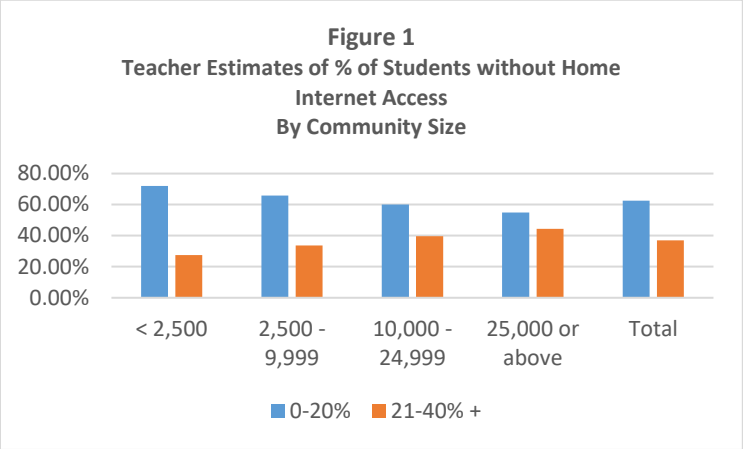
- Over three-fourths (77%) of teachers agreed that if all students had broadband internet access at home, it would positively impact student learning/achievement.
- Nearly half of teachers (48%) agreed that the absence of home internet access for some students affects the level or amount of homework assigned.
- Most teachers report using digital resources for a minority of their homework assignments, with 64% of respondents indicating that less than 25% of their homework assignments are dependent on digital or internet-based resources.
- Overall, 37% of teachers estimated that 21% to greater than 40% of students do not have home internet access.

Most teachers (90%) reported that accommodations are made to address students' lack of home internet access. The accommodations cited included:

- Providing more class time to complete homework assignments (55%)
- Providing some students with printed materials that otherwise would be internet-based (41%)
- Providing before-school and after-school time to complete homework assignments. (33%)
- Informing families about community locations where free Wi-Fi is available 27%
- Assigning less homework overall (26%)
- Allowing more days for students to complete their homework assignments (26%)
- Placing less emphasis on homework for students' overall grades (20%)
- Other (13%)
- Lending cellular hotspots to students for home internet access (3%)

Teacher estimates of the proportion of students not having home internet access varied by ESU and community size.

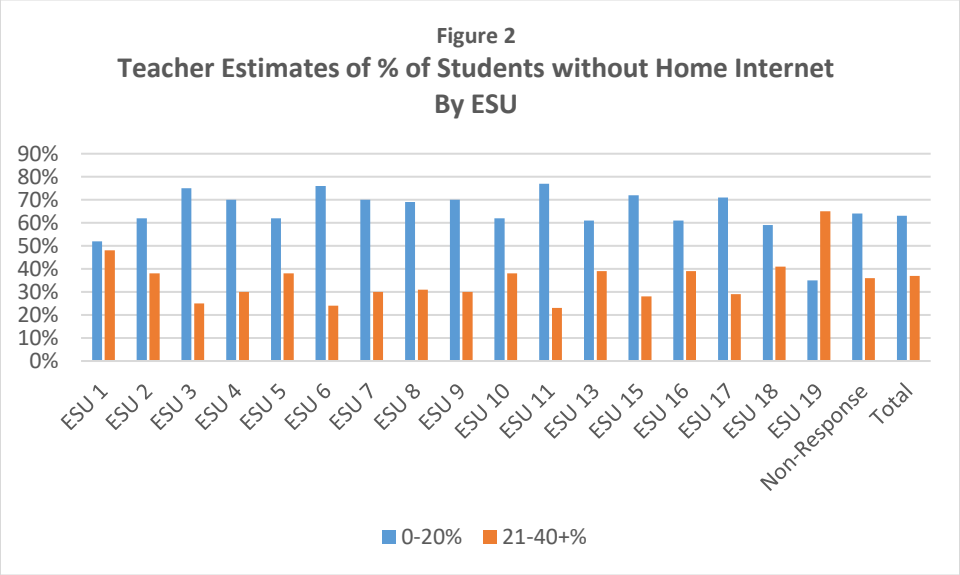
The percent of teachers estimating that the percent of students lacking home internet access was 21% or greater increased with the size of the community, with 45% of those teaching in communities of



25,000 or larger estimating that at least 21% of students lacked home internet access. (See Figure 1 and Table 1.)

Table 1
Teacher Estimates of % of Students without Home Internet Access By Community Size

Size of Community	0-20%	21-40+%
< 2,500	72%	28%
2,500 - 9,999	66%	34%
10,000 - 24,999	60%	40%
25,000 or above	55%	45%
Total	63%	37%



The percent of teachers estimating that at least 21% of students lacked home internet access by ESU ranged from a low of 23% in ESU 11 to a high of 65% in ESUs 19. (See Figure 2 and Table 2.)

Table 2

Teacher Estimates of % of Students without Home Internet Access By ESU

ESU	0-20%	21-40+%
ESU 1	52%	48%
ESU 2	62%	38%
ESU 3	75%	25%
ESU 4	70%	30%
ESU 5	62%	38%
ESU 6	76%	24%
ESU 7	70%	30%
ESU 8	69%	31%
ESU 9	70%	30%
ESU 10	62%	38%
ESU 11	77%	23%
ESU 13	61%	39%
ESU 15	72%	28%
ESU 16	61%	39%
ESU 17	71%	29%
ESU 18	59%	41%
ESU 19	35%	65%
Non-Response	64%	36%
Total	63%	37%

Nebraska Homework Gap Survey: Summary Report

August 22, 2019

Prepared by

Office of Data, Research and Evaluation
Nebraska Department of Education

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Background

This summary report has been prepared in support of the Nebraska Department of Education's partnership with the Nebraska Rural Broadband Task Forces' Homework Gap Subcommittee to conduct a survey of Nebraska public PreK-12 teachers. The purpose of this brief questionnaire is to help determine the degree to which the absence of students' home internet is influencing the instructional environment.

Contributors

This report was prepared by the following researchers at the Office of Data, Research and Evaluation at the Nebraska Department of Education:

- Hongwook Suh, Ph.D., Director and Psychometrician Lead
- Justine Yeo, Statistical Research Analyst
- Kunal Dash, Statistical Research Analyst
- Fisayo Adeniyan, Statistical Research Analyst

Procedures

The anonymous survey was administered to Nebraska teachers as determined by the "Position Assignment Code" submitted via the Nebraska Student and Staff Record System (NSSRS). Specifically, teachers were defined as having teaching positions with the maximum FTE for the first agency ID listed from 2018-2019 database The population list was generated for teachers from all public and state-operated districts. Emails were obtained for all survey participants via NDE's Education Administration Email List, the NDE Teacher Certification Database, or school websites. All efforts were made to obtain valid email addresses for those selected to be survey participants, however, if a valid email was not available the participant was removed from the sample.

The survey was administered electronically using the Qualtrics web application. The survey consisted of both multiple choice and open-ended response questions. There were a total of 12 questions. Surveys were disseminated via an email message (see Appendix B.) from Nebraska Office of the CIO/NITC, Education I.T. Manager, Tom Rolfes on July 9th, 2019 followed pre-notice to the Superintendents on July 8th, 2019. Two additional emails were sent on July 16th and July 23rd, 2019 to serve as reminders to complete the survey if they had not done so already. Data collection was closed on the morning of July 30th, 2019. Below is a table showing participant response rates.

Table 1. Response Rate

Population size	Valid Emails	Responses	Response rate
21,473	21,443	6,919	32.26%

Results

This section will display some of the results from the Homework Gap survey given to Nebraska public school teachers. For a full descriptive tables for survey questions please see Appendix A. Participants were asked a number of community level questions so that survey responses could be disaggregated to show any discrepancies or patterns between groups. These differences are of a descriptive nature and further analysis is needed to determine if any of the discrepancies are statistically significant. Please note that these community level questions were self-reported by the participant and no effort was made to verify the accuracy of the responses.

1. The proportion of students do not have internet access at home to complete homework: Disaggregated by the size of the community (Question 5 vs. 9 cross tabulation)

a. Frequency table

Q5 and 9	0-10%	11-20%	21-30%	31-40%	More than 40%	Non-Response	Total
< 2,500	873	689	292	153	150	13	2170
2,500 - 9,999	404	327	198	101	76	4	1110
10,000 - 24,999	198	194	109	74	76	2	653
25,000 or above	940	698	460	346	524	18	2986
Total	2415	1908	1059	674	826	37	6919

b. Percentile

Q5 and 9	0-10%	11-20%	21-30%	31-40%	More than 40%	Non-Response
< 2,500	40.2%	31.8%	13.5%	7.1%	6.9%	0.6%
2,500 - 9,999	36.4%	29.5%	17.8%	9.1%	6.8%	0.4%
10,000 - 24,999	30.3%	29.7%	16.7%	11.3%	11.6%	0.3%
25,000 or above	31.5%	23.4%	15.4%	11.6%	17.5%	0.6%
Total	34.9%	27.6%	15.3%	9.7%	11.9%	0.5%

2. The proportion of students do not have internet access at home to complete homework by ESU (Question 6 vs. 9 cross tabulation)

a. Frequency table

Q6 and 9	0-10%	11-20%	21-30%	31-40%	More than 40%	Total
ESU 1	117	103	70	32	104	426
ESU 2	85	106	60	41	15	307
ESU 3	711	353	158	97	100	1419
ESU 4	63	52	26	9	14	164
ESU 5	48	78	36	28	13	203
ESU 6	146	93	42	21	12	314

ESU 7	120	112	55	20	24	331
ESU 8	118	105	52	28	20	323
ESU 9	96	89	35	18	25	263
ESU 10	213	165	106	59	70	613
ESU 11	71	56	19	12	8	166
ESU 13	86	122	62	40	32	342
ESU 15	27	34	16	5	3	85
ESU 16	70	64	36	22	29	221
ESU 17	34	20	14	7	1	76
ESU 18	212	178	117	85	67	659
ESU 19	149	152	137	141	274	853
Non-Response	49	26	18	9	15	117
Total	2415	1908	1059	674	826	6882

b. Percentile

Q6 and 9	0-10%	11-20%	21-30%	31-40%	More than 40%
ESU 1	27.5%	24.2%	16.4%	7.5%	24.4%
ESU 2	27.7%	34.5%	19.5%	13.4%	4.9%
ESU 3	50.1%	24.9%	11.1%	6.8%	7.0%
ESU 4	38.4%	31.7%	15.9%	5.5%	8.5%
ESU 5	23.6%	38.4%	17.7%	13.8%	6.4%
ESU 6	46.5%	29.6%	13.4%	6.7%	3.8%
ESU 7	36.3%	33.8%	16.6%	6.0%	7.3%
ESU 8	36.5%	32.5%	16.1%	8.7%	6.2%
ESU 9	36.5%	33.8%	13.3%	6.8%	9.5%
ESU 10	34.7%	26.9%	17.3%	9.6%	11.4%
ESU 11	42.8%	33.7%	11.4%	7.2%	4.8%
ESU 13	25.1%	35.7%	18.1%	11.7%	9.4%
ESU 15	31.8%	40.0%	18.8%	5.9%	3.5%
ESU 16	31.7%	29.0%	16.3%	10.0%	13.1%
ESU 17	44.7%	26.3%	18.4%	9.2%	1.3%
ESU 18	32.2%	27.0%	17.8%	12.9%	10.2%
ESU 19	17.5%	17.8%	16.1%	16.5%	32.1%
Non-Response	41.9%	22.2%	15.4%	7.7%	12.8%
Total	35.1%	27.7%	15.4%	9.8%	12.0%

3. The proportion of homework assignment based on digital resource: Based on Majority of students using district owned computer devices (Question 7 vs. 8 cross tabulation)

Q7 and 8	Frequency			%			Total
	Yes	No	Non-Response	Yes	No	Non-Response	
Up to 25%	1413	2955	2	32.3%	67.6%	0.0%	4370
25 - 50%	644	387	2	62.3%	37.5%	0.2%	1033
50 - 75%	582	169		77.5%	22.5%		751
75 - 100%	49	6		89.1%	10.9%		55
100%	490	119		80.5%	19.5%		609
Total	3178	3636	4				6818

4. Types of instructional accommodations to address students' lack of home internet access: Based on Majority of students using district owned computer devices (Question 7 vs. 11 cross tabulation)

Q7 and 11	Frequency			%			Total
	Yes	No	Non-Response	Yes	No	Non-Response	
1	58	92		38.7%	61.3%		150
2	53	38		58.2%	41.8%		91
3	65	173		27.3%	72.7%		238
4	24	42		36.4%	63.6%		66
5	202	285		41.5%	58.5%		487
6	100	142		41.3%	58.7%		242
7	8			100.0%	0.0%		8
8	50	60		45.5%	54.5%		110
9	116	446	1	20.6%	79.2%	0.2%	563
10	205	468		30.5%	69.5%		673
5,6	103	102		50.2%	49.8%		205
5,6,8	108	50		68.4%	31.6%		158
1,5,6,8	97	33		74.6%	25.4%		130
2,5,6,8	81	49		62.3%	37.7%		130
1,2,5,6,8	83	45		64.8%	35.2%		128
5,8	56	54		50.9%	49.1%		110

** Note: Q11 allows multiple responses from the options. Table only displays results from single options and multiple options that have more than 100 responses.*

5. The types of instructional accommodations to address students' lack of home internet access: Disaggregated by the proportion of homework assignment based on digital resource (Question 8 vs. 11 cross tabulation)

a. Frequency table

Q8 and 11	Up to 25%	25 - 50%	50 - 75%	75 - 100%	100%	Total
Families are informed about community locations where free Wi-Fi is available	112	12	11	1	11	147
I allow more days (longer duration) for students to complete their homework assignments	63	20	6		1	90
I assign less homework overall	187	21	17	1	9	235
I place less emphasis on homework for students' overall grades	51	7	5		3	66
I provide more class time to complete homework assignments	344	77	34	3	28	486
Some students are provided printed materials that otherwise would be Internet-based	160	33	19	2	26	240
The school lends cellular hotspots to students for home Internet access	3	3	1		1	8
The school provides before-school and after-school time to complete homework assignments	75	17	9		6	107
Other	474	19	14	5	13	525
I do not make any accommodations	557	39	30	1	31	658

b. Percentile

Q8 and 11	Up to 25%	25 - 50%	50 - 75%	75 - 100%	100%
Families are informed about community locations where free Wi-Fi is available	76.2%	8.2%	7.5%	0.7%	7.5%
I allow more days (longer duration) for students to complete their homework assignments	70.0%	22.2%	6.7%	0.0%	1.1%
I assign less homework overall	79.6%	8.9%	7.2%	0.4%	3.8%
I place less emphasis on homework for students' overall grades	77.3%	10.6%	7.6%	0.0%	4.5%
I provide more class time to complete homework assignments	70.8%	15.8%	7.0%	0.6%	5.8%
Some students are provided printed materials that otherwise would be Internet-based	66.7%	13.8%	7.9%	0.8%	10.8%
The school lends cellular hotspots to students for home Internet access	37.5%	37.5%	12.5%	0.0%	12.5%

The school provides before-school and after-school time to complete homework assignments	70.1%	15.9%	8.4%	0.0%	5.6%
Other	90.3%	3.6%	2.7%	1.0%	2.5%
I do not make any accommodations	84.7%	5.9%	4.6%	0.2%	4.7%

6. The proportion of homework assignment based on digital resources: Disaggregated by subject areas of teaching (Question 4 vs. 8 cross tabulation)

a. Frequency table

Q4 and 8	Up to 25%	25 - 50%	50 - 75%	75 - 100%	100%	Non-Response	Total
Mathematics	478	99	71	5	79	2	734
Science	259	132	102	9	69	1	572
Social Studies	158	115	91	6	88	1	459
English/Language Arts	592	236	169	3	120	9	1129
Fine/Performing Arts	258	49	26	6	19	5	363
Health and Physical Education	161	43	23	2	31	4	264
World Languages	99	37	42	1	21	1	201
Business/Technology	62	36	49	9	76		232
Industrial Technology/Agriculture	66	34	27	2	17		146
Elementary (All Subjects)	1790	151	65	1	19	49	2075
Special Education	230	39	43		17	17	346
Other	217	62	43	11	53	12	398
Total	4370	1033	751	55	609	101	6919

b. Percentile

Q4 and 8	Up to 25%	25 - 50%	50 - 75%	75 - 100%	100%	Non-Response
Mathematics	65.1%	13.5%	9.7%	0.7%	10.8%	0.3%
Science	45.3%	23.1%	17.8%	1.6%	12.1%	0.2%
Social Studies	34.4%	25.1%	19.8%	1.3%	19.2%	0.2%
English/Language Arts	52.4%	20.9%	15.0%	0.3%	10.6%	0.8%
Fine/Performing Arts	71.1%	13.5%	7.2%	1.7%	5.2%	1.4%
Health and Physical Education	61.0%	16.3%	8.7%	0.8%	11.7%	1.5%
World Languages	49.3%	18.4%	20.9%	0.5%	10.4%	0.5%
Business/Technology	26.7%	15.5%	21.1%	3.9%	32.8%	0.0%
Industrial Technology/Agriculture	45.2%	23.3%	18.5%	1.4%	11.6%	0.0%
Elementary (All Subjects)	86.3%	7.3%	3.1%	0.0%	0.9%	2.4%
Special Education	66.5%	11.3%	12.4%	0.0%	4.9%	4.9%
Other	54.5%	15.6%	10.8%	2.8%	13.3%	3.0%
Total	63.2%	14.9%	10.9%	0.8%	8.8%	1.5%

7. The proportion of homework assignment based on digital resources: Disaggregated by educator's level of proficiency with educational technology (Question 2 vs. 8 cross tabulation)

a. Frequency table

Q2 and 8	Up to 25%	25 - 50%	50 - 75%	75 - 100%	100%	Non-Response	Total
Very High (Expert)	169	84	89	16	104	2	464
Above Average	1684	555	436	30	368	28	3101
Average	2321	371	218	8	129	59	3106
Below Average	181	22	6	1	7	12	229
Very Low (Novice)	15	1	2		1		19
Total	4370	1033	751	55	609	101	6919

b. Percentile

Q2 and 8	Up to 25%	25 - 50%	50 - 75%	75 - 100%	100%	Non-Response
Very High (Expert)	36.4%	18.1%	19.2%	3.4%	22.4%	0.4%
Above Average	54.3%	17.9%	14.1%	1.0%	11.9%	0.9%
Average	74.7%	11.9%	7.0%	0.3%	4.2%	1.9%
Below Average	79.0%	9.6%	2.6%	0.4%	3.1%	5.2%
Very Low (Novice)	78.9%	5.3%	10.5%	0.0%	5.3%	0.0%
Total	63.2%	14.9%	10.9%	0.8%	8.8%	1.5%

10. The proportion of homework assignment based on digital resources: Disaggregated by grade level (Question 3 vs. 8 cross tabulation, while sub-aggregating Question 3 responses)

a. Aggregated educational level

Q3 and 8	Up to 25%	25 - 50%	50 - 75%	75 - 100%	100%	Non-Response	Total
Primary Grades	2498	272	131	7	81	95	3084
Intermediate Grades	2511	416	200	9	133	49	3318
Middle School Grades	2348	909	657	41	541	22	4518
High School Grades	4305	1881	1617	141	1410	31	9385
Total	11662	3478	2605	198	2165	197	20305

** Note: Question 3 allows multiple responses and analyses are based on those multiple response as single responses.*

b. Detailed level

Q3 and 8	Up to 25%	25 - 50%	50 - 75%	75 - 100%	100%	Non-Response	Total
Pre-K	205	20	10		4	24	263
K	731	75	37	3	26	28	900
1	752	93	40	2	26	22	935
2	810	84	44	2	25	21	986
3	823	108	59	2	32	19	1043
4	825	129	54	3	41	18	1070
5	863	179	87	4	60	12	1205
6	737	223	159	8	124	10	1261
7	787	332	250	15	202	6	1592
8	824	354	248	18	215	6	1665
9	1021	437	364	30	319	7	2178
10	1083	470	406	35	342	7	2343
11	1107	489	426	38	374	8	2442
12	1094	485	421	38	375	9	2422
Total	11662	3478	2605	198	2165	197	20305

** Note: Question 3 allows multiple responses and analyses are based on those multiple response as single responses.*

Appendix A.
Questions 1- 12 Simple Frequency with percentile information tables

1. How long have you been teaching?

#	Answer	%	Count
1	Less than a year	0.42%	29
2	1-2 years	5.65%	391
3	3-5 years	11.38%	787
4	6-10 years	16.63%	1150
5	11-19 years	27.44%	1898
6	20 or more years	38.48%	2662
	Total	100%	6917

2. Please identify your level of proficiency with educational technology hardware and software.

#	Answer	%	Count
1	Very High (Expert)	6.71%	464
2	Above Average	44.82%	3100
3	Average	44.89%	3105
4	Below Average	3.31%	229
5	Very Low (Novice)	0.27%	19
	Total	100%	6917

3. Which of the following grade levels of students do you teach? Please check all that apply.

#	Answer	%	Count
1	Pre-K	1.30%	263
2	K	4.43%	900
3	1	4.61%	935
4	2	4.86%	986
5	3	5.14%	1043
6	4	5.27%	1069
7	5	5.94%	1205
8	6	6.21%	1261
9	7	7.84%	1592
10	8	8.20%	1665
11	9	10.73%	2178
12	10	11.54%	2343
13	11	12.02%	2441
14	12	11.92%	2421
	Total	100%	20302

4. Which subject area do you spend the most time teaching? Please select only one.

#	Answer	%	Count
1	Mathematics	10.61%	734
2	Science	8.27%	572
3	Social Studies	6.62%	458
4	English/Language Arts	16.32%	1129
5	Fine/Performing Arts	5.25%	363
6	Health and Physical Education	3.82%	264
7	World Languages	2.91%	201
8	Business/Technology	3.35%	232
9	Industrial Technology/Agriculture	2.11%	146
10	Elementary (All Subjects)	29.98%	2074
11	Special Education	5.00%	346
12	Other (please specify):	5.75%	398
	Total	100%	6917

Other Area Specifics:

Subjects	N
21st Century	1
Administration	3
JROTC	8
Agriculture	5
All Areas	13
Alt Ed.	6
History	1
Art	8
Technology	4
Automotive	2
Media	8
Math	4
Career	9
CNA	1
Computer Science	11
Spanish	3
Counseling	11
Creative Curriculum	1
Culinary Arts	2
Deaf Ed.	1
Development	1
Early Childhood	9
ELL	36

ESL	20
Engineering	1
English	1
FACS	86
Nutrition	1
Functional Vocational Skills	1
Etc.	1
Music	10
Guidance	8
Health Science	5
Honors Special Projects	1
SPED	3
Preschool	15
Intervention	1
Journalism	8
Learning and Play	2
Library	7
Life Skills	4
Reading	24
Outdoor Ed	2
PE	2
PHOTOGRAPHY	1
Post secondary transition	1
Speaking	1
Science	1
Social and emotional development	22
Speech	2
STEM	3
Support	1
Title 1	4
Arts	4
Writing	1
Non-Response	6
Total	398

5. What is the size of the community where your school or school district is located?

#	Answer	%	Count
1	In a rural setting or village or town of less than 2,500 population	31.36%	2169
2	In a city of 2,500 - 9,999 population	16.03%	1109
3	In a city of 10,000 - 24,999 population	9.44%	653
4	In a city of 25,000 or more population	43.17%	2986
	Total	100%	6917

6. In which ESU is your school or school district located? (http://www.esucc.org/NEBRASKA-ESUS)

#	Answer	%	Count
1	ESU 1	6.31%	429
2	ESU 2	4.52%	307
3	ESU 3	20.93%	1423
5	ESU 4	2.99%	203
4	ESU 5	2.43%	165
6	ESU 6	4.63%	315
7	ESU 7	4.88%	332
8	ESU 8	4.79%	326
9	ESU 9	3.91%	266
10	ESU 10	9.06%	616
11	ESU 11	2.46%	167
13	ESU 13	5.04%	343
15	ESU 15	1.26%	86
16	ESU 16	3.25%	221
17	ESU 17	1.12%	76
18	ESU 18 (Lincoln Public Schools)	9.77%	664
19	ESU 19 (Omaha Public Schools)	12.65%	860
	Total	100%	6799

7. Has a majority of your assigned students been provided district-owned computing devices to use at home?

#	Answer	%	Count
1	Yes	46.07%	3184
2	No	53.93%	3727
	Total	100%	6911

8. What proportion of your homework assignments or readings are dependent on digital or Internet-based resources (i.e., non-print resources)?

Answer	%	Count
Up to 25%	64.10%	4369
Between 25% and 50%	15.16%	1033
Between 50% and 75%	11.02%	751
Between 75% and 100%	8.92%	608
100%	0.81%	55
Total	100%	6816

9. What would you estimate as the percentage of your school's students who do not have home Internet access to complete homework?

Answer	%	Count
0-10%	35.09%	2414
11-20%	27.72%	1907
21-30%	15.39%	1059
31-40%	9.80%	674
More than 40%	12.01%	826
Total	100%	6880

10. Please indicate how strongly you agree or disagree with the following statement: The absence of home Internet access for some students in a class affect the level or amount of homework that I assign for all students in that class.

Answer	%	Count
Strongly agree	18.69%	1288
Somewhat agree	29.20%	2012
Neither agree nor disagree	19.32%	1331
Somewhat disagree	14.19%	978
Strongly disagree	18.60%	1282
Total	100%	6891

11. What, if any, instructional accommodations do you (and/or your school) make to address students' lack of home Internet access? Please check all that apply.

a. Frequency for Aggregated response by response choice

#	Answer	%	Count
1	Families are informed about community locations where free Wi-Fi is available.	10.70%	1885
2	I allow more days (longer duration) for students to complete their homework assignments.	10.24%	1803
3	I assign less homework overall.	10.30%	1814
4	I place less emphasis on homework for students' overall grades.	7.63%	1344
5	I provide more class time to complete homework assignments.	21.31%	3754
6	Some students are provided printed materials that otherwise would be Internet-based.	16%	2823
7	The school lends cellular hotspots to students for home Internet access.	0.0112	198
8	The school provides before-school and after-school time to complete homework assignments.	13.04%	2297
9	Other (please specify):	5.03%	886
10	I do not make any accommodations.	4.59%	809
	Total	100.00%	17613

b. Frequency for Actual Response

Response	Total
1	150
2	91
3	238
4	66
5	487
6	242
7	8
8	110
9	563
10	673

1,2	17
1,2,3	8
1,2,3,4	10
1,2,3,4,5	11
1,2,3,4,5,6	24
1,2,3,4,5,6,7	1
1,2,3,4,5,6,7,8	15
1,2,3,4,5,6,8	46
1,2,3,4,5,6,8,9	6
1,2,3,4,5,7,8	3
1,2,3,4,5,8	18
1,2,3,4,5,8,9	1
1,2,3,4,6	4
1,2,3,4,6,7,8	1
1,2,3,4,6,8	6
1,2,3,4,6,8,9	1
1,2,3,4,8	2
1,2,3,5	12
1,2,3,5,6	23
1,2,3,5,6,7	1
1,2,3,5,6,7,8	9
1,2,3,5,6,8	47
1,2,3,5,6,8,9	2
1,2,3,5,6,9	1
1,2,3,5,7,8	1
1,2,3,5,8	17
1,2,3,5,9	1
1,2,3,6	2
1,2,3,6,8	4
1,2,3,6,8,9	1
1,2,3,8	1
1,2,3,9	2
1,2,4	4
1,2,4,5	7
1,2,4,5,6	9
1,2,4,5,6,7,8	5
1,2,4,5,6,8	31
1,2,4,5,6,8,9	2
1,2,4,5,7	1
1,2,4,5,7,8	2
1,2,4,5,8	8
1,2,4,5,8,9	2
1,2,4,6	8
1,2,4,6,7,8	1

1,2,4,6,8	8
1,2,4,8	2
1,2,5	46
1,2,5,6	48
1,2,5,6,7	2
1,2,5,6,7,8	10
1,2,5,6,8	128
1,2,5,6,8,9	7
1,2,5,6,9	6
1,2,5,7,8	2
1,2,5,8	33
1,2,5,8,9	1
1,2,6	16
1,2,6,7,8	8
1,2,6,7,8,9	1
1,2,6,8	17
1,2,6,8,9	1
1,2,6,9	2
1,2,7	1
1,2,7,8	1
1,2,8	15
1,3	17
1,3,4	13
1,3,4,5	17
1,3,4,5,6	29
1,3,4,5,6,7,8	1
1,3,4,5,6,8	29
1,3,4,5,6,8,9	3
1,3,4,5,7	1
1,3,4,5,7,8	2
1,3,4,5,8	14
1,3,4,6	4
1,3,4,6,8	3
1,3,4,7,8	1
1,3,4,8	3
1,3,4,8,9	1
1,3,5	28
1,3,5,6	28
1,3,5,6,7,8	3
1,3,5,6,8	37
1,3,5,6,8,9	3
1,3,5,6,9	1
1,3,5,7	1
1,3,5,7,8	1

1,3,5,8	24
1,3,5,8,9	2
1,3,5,9	1
1,3,6	9
1,3,6,7	1
1,3,6,8	6
1,3,8	5
1,3,9	2
1,4	9
1,4,5	12
1,4,5,6	22
1,4,5,6,7	1
1,4,5,6,8	23
1,4,5,6,9	1
1,4,5,7,8	1
1,4,5,8	18
1,4,5,8,9	1
1,4,5,9	1
1,4,6	8
1,4,6,7,8	1
1,4,6,8	7
1,4,6,8,9	1
1,4,8	8
1,4,8,9	1
1,5	55
1,5,6	68
1,5,6,7	1
1,5,6,7,8	9
1,5,6,7,8,9	1
1,5,6,8	130
1,5,6,8,9	8
1,5,6,9	4
1,5,7,8	6
1,5,8	72
1,5,8,9	6
1,6	40
1,6,7	2
1,6,7,8	6
1,6,7,8,9	2
1,6,8	75
1,6,8,9	9
1,6,9	5
1,7,8	3
1,8	38

1,8,9	4
1,9	20
10,1	12
10,1,2,3,4,5,6,8	1
10,1,2,4	1
10,1,2,5,6,8	1
10,1,2,6,8	1
10,1,3,4	1
10,1,3,4,5	2
10,1,4,6	1
10,1,5,6,8,9	1
10,1,5,8	3
10,1,6	4
10,1,7	1
10,1,8	4
10,1,9	2
10,2,3,4,5	1
10,2,3,5	1
10,2,4	1
10,2,4,5	1
10,2,5	1
10,2,5,8	1
10,3	5
10,3,4	2
10,3,4,5	2
10,3,4,5,6,8	1
10,3,5	2
10,3,5,6	1
10,3,9	2
10,4	1
10,4,5,8	1
10,4,6	1
10,5	4
10,5,6	1
10,5,8	2
10,6	4
10,6,8	5
10,7,8	1
10,7,8,9	1
10,8	13
10,8,9	2
10,9	44
2,3	15
2,3,4	5

2,3,4,5	47
2,3,4,5,6	58
2,3,4,5,6,7	1
2,3,4,5,6,7,8	4
2,3,4,5,6,7,9	1
2,3,4,5,6,8	39
2,3,4,5,6,8,9	2
2,3,4,5,6,9	2
2,3,4,5,7,8	1
2,3,4,5,8	17
2,3,4,5,9	1
2,3,4,6	3
2,3,4,6,8	5
2,3,4,6,8,9	2
2,3,4,8	2
2,3,5	48
2,3,5,6	58
2,3,5,6,7	1
2,3,5,6,7,8	6
2,3,5,6,8	39
2,3,5,6,8,9	2
2,3,5,6,9	4
2,3,5,7	1
2,3,5,7,8	1
2,3,5,8	32
2,3,6	5
2,3,6,8	2
2,3,8	1
2,3,9	2
2,4	2
2,4,5	19
2,4,5,6	24
2,4,5,6,7	1
2,4,5,6,7,8	1
2,4,5,6,8	17
2,4,5,6,8,9	1
2,4,5,6,9	2
2,4,5,8	9
2,4,6	13
2,4,6,8	8
2,4,7,8,9	1
2,4,8	4
2,4,8,9	1
2,5	94

2,5,6	94
2,5,6,7,8	3
2,5,6,8	130
2,5,6,8,9	7
2,5,6,9	1
2,5,7	1
2,5,7,8	1
2,5,8	64
2,5,9	1
2,6	13
2,6,7,8	2
2,6,8	29
2,6,8,9	3
2,7	2
2,8	14
2,8,9	1
3,4	30
3,4,5	77
3,4,5,6	67
3,4,5,6,7,8	1
3,4,5,6,8	32
3,4,5,6,8,9	1
3,4,5,6,9	3
3,4,5,7	1
3,4,5,8	30
3,4,5,8,9	1
3,4,5,9	5
3,4,6	15
3,4,6,8	9
3,4,8	7
3,4,8,9	2
3,4,9	3
3,5	83
3,5,6	68
3,5,6,7	1
3,5,6,7,8	4
3,5,6,8	44
3,5,6,8,9	2
3,5,6,9	4
3,5,7,8	2
3,5,8	31
3,5,9	3
3,6	21
3,6,7	1

3,6,8	9
3,6,9	1
3,7	1
3,8	6
3,8,9	3
3,9	11
4,5	44
4,5,6	52
4,5,6,7	1
4,5,6,7,8	1
4,5,6,8	27
4,5,6,8,9	1
4,5,7	2
4,5,7,8	2
4,5,8	24
4,5,9	3
4,6	20
4,6,7,8	1
4,6,8	18
4,8	8
4,8,9	3
4,9	3
5,6	205
5,6,7	2
5,6,7,8	12
5,6,8	158
5,6,8,9	8
5,6,9	7
5,7,8	3
5,8	110
5,8,9	11
5,9	20
6,7	2
6,7,8	10
6,8	67
6,8,9	5
6,9	11
7,8	1
7,8,9	1
7,9	1
8,9	11
Total	**6870**

12. If, suddenly, every one of your students had broadband Internet access at home, what level of impact might this have on student learning/achievement?"

#	Answer	%	Count
1	Substantial negative impact	1.51%	104
2	Minimal negative impact	2.86%	197
3	No impact	18.30%	1259
4	Minimal positive impact	50.02%	3441
5	Substantial positive impact	27.30%	1878
	Total	100%	6879

Appendix B.
Sample Email Communication messages

Pre-notice to Superintendents
Date: Monday, July 8, 2019
Subject: Pre-notice of 2018-2019 Nebraska Homework Gap Survey

Dear ${m://FirstName} ${m://LastName},

The Nebraska Department of Education is partnering with the Nebraska Rural Broadband Task Force's Homework Gap Subcommittee to conduct a survey of Nebraska public and private PreK-12 teachers. This purpose of this very brief questionnaire is to help determine the degree to which the absence of students' home internet is influencing the instructional environment.

Teacher responses will remain confidential, and reports will only use aggregated results.

We would appreciate your cooperation in encouraging your teachers' participation. A copy of the survey can be accessed here for your viewing: Nebraska Homework Gap Survey

Thank you for your time,

Tom Rolfes
Education I.T. Manager
Nebraska Office of the CIO/NITC

Email Invitation
Date: July 9, 2019
Subject: 2018-2019 Nebraska Homework Gap Survey

Dear ${m://FirstName} ${m://LastName},

The Nebraska Department of Education is looking to improve how student data is used to inform school practices. As such, we are requesting your participation in the 2018-19 Homework Gap Survey. The survey is designed to gather your input regarding how the absence of some students' access to home internet is affecting your teaching and if any accommodations are being provided for these students.

The survey should only take two to three minutes to complete. Your responses to this survey will remain completely confidential, and reports will only use aggregated results. Please complete the survey by **July 30, 2019**.

The survey can be accessed by clicking on the following link:
${l://SurveyLink?d=Take%20the%20Survey}

Should you have any questions, please direct them to nde.research@nebraska.gov or tom.rolfes@nebraska.gov .

Thank you for your time.

Sincerely,

Tom Rolfes
Education I.T. Manager
Nebraska Office of the CIO/NITC

Email Reminder
Date: July 16, 2019
Subject: Reminder: 2018-2019 Nebraska Homework Gap Survey

Dear ${m://FirstName} ${m://LastName},

On July 9, we sent you an email invitation to participate in the 2018-19 Homework Gap Survey. This survey is important as it provides the Nebraska Department of Education with input regarding how the absence of some students' access to home internet is affecting your teaching and if any accommodations are being provided for these students. To the best of our knowledge, you have yet to respond to this survey. We are reaching out to you again because **your response is very important to us**.

The survey should only take two to three minutes to complete. Your responses to this survey will remain completely confidential, and reports will only use aggregated results. Please complete the survey by **July 30, 2019.**

The survey can be accessed by clicking on the following link:
${l://SurveyLink?d=Take%20the%20Survey}

Should you have any questions, please direct them to nde.research@nebraska.gov or tom.rolfes@nebraska.gov .

Thank you for your time.

Sincerely,

Tom Rolfes
Education I.T. Manager
Nebraska Office of the CIO/NITC

Final Email Reminder
Date: July 23, 2019
Subject: Final Reminder: 2018-2019 Nebraska Homework Gap Survey

Dear ${m://FirstName} ${m://LastName},

On July 9, 2019, and again on July 16, 2019, we sent you an email invitation to participate in the 2018-19 Homework Gap Survey. This survey is important as it seeks to determine how the absence of some students' access to home internet is affecting your teaching and if any accommodations are being provided for these students. To the best of our knowledge, you have yet to respond to this survey. We are reaching out to you again because **your response is very important to us**.

The survey should only take two to three minutes to complete. Your responses to this survey will remain completely confidential, and reports will only use aggregated results. Please complete the survey by **July 30, 2019.**

The survey can be accessed by clicking on the following link:
${l://SurveyLink?d=Take%20the%20Survey}

Should you have any questions, please direct them to nde.research@nebraska.gov or tom.rolfes@nebraska.gov .

Thank you for your time.

Sincerely,

Tom Rolfes
Education I.T. Manager
Nebraska Office of the CIO/NITC

Appendix C.
Survey Instruments

Default Question Block

Nebraska Homework Gap Survey

Welcome!

The Nebraska Rural Broadband Task Force's (https://ruralbroadband.nebraska.gov) Homework Gap Subcommittee is conducting a non-scientific questionnaire of Nebraska public and private PreK-12 teachers to help determine the degree to which the absence of Internet at students' homes is influencing the instructional environment. There are 12 short questions that should not require longer than 3 minutes to complete. Your responses will remain confidential, and reports will only use aggregated results.

1. How long have you been teaching?

- ○ Less than a year
- ○ 1-2 years
- ○ 3-5 years
- ○ 6-10 years
- ○ 11-19 years
- ○ 20 or more years

2. Please identify your level of proficiency with educational technology hardware and software.

- ○ Very High (Expert)
- ○ Above Average
- ○ Average

- ○ Below Average
- ○ Very Low (Novice)

3. Which of the following grade levels of students do you teach? *Please check all that apply.*

- ☐ Pre-K
- ☐ K
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10
- ☐ 11
- ☐ 12

4. Which subject area do you spend the most time teaching? *Please select only one.*

- ○ Business/Technology
- ○ Elementary (All Subjects)
- ○ English/Language Arts
- ○ Fine/Performing Arts
- ○ Health and Physical Education
- ○ Industrial Technology/Agriculture
- ○ Mathematics
- ○ Science
- ○ Social Studies
- ○ Special Education
- ○ World Languages
- ○ Other (please specify): _____

5. What is the size of the community where your school or school district is located?

- ○ In a rural setting or village or town of less than 2,500 population
- ○ In a city of 2,500 - 9,999 population
- ○ In a city of 10,000 - 24,999 population
- ○ In a city of 25,000 or more population

6. In which ESU is your school or school district located? (http://www.esucc.org/NEBRASKA-ESUS)

7. Has a majority of your assigned students been provided district-owned computing devices to use at home?

- ○ Yes
- ○ No

8. What proportion of your homework assignments or readings are dependent on digital or Internet-based resources (i.e., non-print resources)?

- ○ Up to 25%
- ○ Between 25% and 50%
- ○ Between 50% and 75%
- ○ Between 75% and 100%
- ○ 100%

9. What would you estimate as the percentage of your school's students who do not have home Internet access to complete homework?

- ○ 0-10%
- ○ 11-20%
- ○ 21-30%
- ○ 31-40%
- ○ More than 40%

10. Please indicate how strongly you agree or disagree with the following statement:

The absence of home Internet access for some students in a class affect the level or amount of homework that I assign for all students in that class.

- ○ Strongly agree
- ○ Somewhat agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

11. Do you (and/or your school) make, if any, accommodations to address students' lack of home Internet access?

- ○ Yes
- ○ No

What accommodations do you (and/or your school) make to address students' lack of home internet access? *Please check all that apply.*

- ☐ Families are informed about community locations where free Wi-Fi is available.
- ☐ I allow more days (longer duration) for students to complete their homework assignments.
- ☐ I assign less homework overall.
- ☐ I place less emphasis on homework for students' overall grades.
- ☐ I provide more class time to complete homework assignments.
- ☐ Some students are provided printed materials that otherwise would be Internet-based.
- ☐ The school lends cellular hotspots to students for home Internet access.
- ☐ The school provides before-school and after-school time to complete homework assignments.
- ☐ Other (please specify):

12. If, suddenly, every one of your students had broadband Internet access at home, what level of impact might this have on student learning/achievement?

- ○ Substantial negative impact
- ○ Minimal negative impact
- ○ No impact
- ○ Minimal positive impact
- ○ Substantial positive impact

Final Page

If you have any other comments on this survey, please provide them in the box below. Otherwise, please hit the "Submit" button to exit the survey.

NDE #20-6967

For more information about this survey, please contact:
Tom Rolfes | Office of the CIO | Tom.Rolfes@nebraska.gov | 402-471-7969

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Appendix 11

List of Speakers and Invited Stakeholders at Rural Broadband Task Force and Subcommittee Meetings

As of Sept. 26, 2019

Jason Axthelm, NebraskaLink
Greg Baltzer, Geneva Broadband
John Barrett, Great Plains Communications
Deonne Bruning, U.S. Cellular
Phil Burke, Polk County Rural Public Power District
Anne Byers, Nebraska Information Technology Commission
Kim Christiansen, Nebraska Rural Electric Association
Russ Elliott, Wyoming Business Council
Tim Erickson, Nebraska Legislature
Trent Fellers, Windstream
Barb Fowler, Polk County Rural Public Power District
Isaiah Graham, Homestead Bank
Jamie Hadden, SpaceX
Brad Hedrick, Windstream
Shirley Higgins, Nebraska Public Power District
Mike Hybl, Nebraska Public Service Commission
Steve Ingracia, Nebraska Department of Transportation
Johnathan Hladik, Center for Rural Affairs
Dr. Angela Hollman, University of Nebraska Kearney
Jonathan Jank, Seward County Chamber and Development Partnership
Shana Knutson, Nebraska Public Service Commission
Matt Larsen, Vistabeam
Tim Lindahl, Wheat Belt Public Power District
Joe Luck, University of Nebraska Lincoln
Mark Massman, RVW, Inc.
Michael Mattmiller, Microsoft
Greg McKee, University of Nebraska-Lincoln
Ansley Mick, Nebraska Farm Bureau
Matt Miller, University of Nebraska Kearney
Roger Meeks, USDA
Charlotte Narjes, University of Nebraska-Lincoln
Rick Nelson, Custer Public Power District
Tim Obermier, University of Nebraska Kearney
Tip O'Neill, Nebraska Legislature
Nick Paden, Remboldt Ludtke

Andy Pollock, Remboldt Ludtke
Jerry Prange, Paige Wireless
Ann Prockish, CenturyLink
Hannah Raudsepp, Honestbeef.com
Mary Ridder, Nebraska Public Service Commission
Cullen Robbins, Nebraska Public Service Commission
Tom Rolfes, Nebraska Information Technology Commission/Office of the CIO
David Rosenbaum, University of Nebraska Lincoln
Hector Santiago, University of Nebraska Lincoln
Paul M. Schudel, Woods & Aitken LLP
Sam Shaw, Nebraska Library Commission
Tom Shoemaker, Pinpoint Communications
Dan Spray, Connecting Point
Tessa Terry, Nebraska Library Commission
Brian Thompson, Consolidated Telephone
Dusty Vaughan, Paige Wireless
Dr. Mehmet Can Vuran, University of Nebraska Lincoln
Gary Warren, Hamilton Telecommunications
John Watermolen, State of Nebraska Office of the CIO
Dave Webb, Nebraska Public Power District
Doc Wininger, Pinpoint
SuAnn Witt, Nebraska Department of Education
Holly Woldt, Nebraska Library Commission
Wayne Woldt, University of Nebraska Lincoln
Jeff Yost, Nebraska Community Foundation
David Young, Unified Government, Wyandotte County and Kansas City, Kansas
Doug Zalesky, University of Nebraska Lincoln

Appendix 12

Metrics

Fixed Broadband Availability	
Measure	**2019 Most Recent Data** 25 Mbps down/3 Mbps up December 2017, FCC Form 477
The percent of Nebraskans with access to fixed broadband	87%
The percent of rural Nebraskans with access to fixed broadband	58%
How Nebraska compares with neighboring on fixed broadband availability	6th out of 7
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.

Mobile Broadband Availability	
Measure	**2019 Most Recent Data** 10 Mbps down/3 Mbps up December 2017, FCC Form 477
The percent of Nebraskans with access to mobile broadband	83%
The percent of rural Nebraskans with access to mobile broadband	56%
How Nebraska compares with neighboring on mobile broadband availability	6th 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.

Average Fixed Speeds	
Measure	**2019 Most Recent Data** 2018, Ookla
Average fixed download speed in Nebraska	89 Mbps
How Nebraska compares with neighboring states on average fixed download speeds	4th out of 7
How Nebraska compares with U.S. on average fixed download speeds	**Nebraska lags the U.S.** The average fixed download speed in the U.S. is 96 Mbps.
Average fixed upload speed in Nebraska	44 Mbps
How Nebraska compares with neighboring states on average fixed upload speeds	2nd out of 7
How Nebraska compares with U.S. on average fixed upload speeds	**Nebraska beats the U.S.** The average upload speed in the U.S. is 33 Mbps.

Average Mobile Speeds	
Measure	**2019 Most Recent Data** 2018, Ookla
Average mobile download speed in Nebraska	20.8 Mbps
How Nebraska compares with neighboring states on average mobile download speeds	5th out of 7
How Nebraska compares with U.S. on average mobile download speeds	**Nebraska lags the U.S.** The average mobile download speed in the U.S. is 20.8 Mbps
Average mobile upload speed in Nebraska	7.72 Mbps
How Nebraska compares with neighboring states on average mobile download speeds	5th out of 7
How Nebraska compares with U.S. on average mobile download speeds	**Nebraska lags the U.S** The average mobile upload speed in the U.S. is 8.63 Mbps

NUSF	
Measure	**2019 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)
Annual allocations from the Nebraska Universal Service Fund (By Calendar Year)	2017 – $40,087,483 2018 - $33,139,591 2019 - $30,056,117 (Additional allocations may still be made in 2019)
The number of households and businesses in Nebraska which have broadband (25/3 Mbps Down/Up) available as a result of CAF II funding	A-CAM (2016-2018) – 3,828 Locations CAF II (Price Cap Carriers) – 677 locations
The number of households and businesses in Nebraska which have, or will have broadband available as a result of NUSF funding (Includes only High Cost programs, NUSF-99 and NUSF-108)	NUSF-99 Projects (2016-Present) – 8,092 NUSF-108 Projects (2019) – 346 (Includes project notices received as of 8/9/2019)

Public Private Partnerships	
Measure	**2019 Most Recent Data** July 2019, Nebraska Public Service Commission
The number of leases of dark fiber from public entities	1

Percent of Nebraskans Lacking Home Internet Subscriptions or Subscribing to Mobile Only	
Measure	**Most Recent Data**
Percent of Nebraskans who lack a home internet subscription	16% 2017, ACS 5-Year
Percent of Nebraskans under 18 years of age who lack a home internet subscription	12% 2017, ACS 5 Year
Percent of U.S. adults with a mobile only broadband subscription	17% 2019, Pew Research Center

Percent Nebraska Libraries and Schools Districts Applying for E-Rate	
Measure	**Most Recent Data**
Percent of Nebraska **Libraries** Applying for **Category 1** (External Connections) E-Rate	25% 2019-20, USAC
Percent of Nebraska **Libraries** Applying for **Category 2** (Internal Connections) E-Rate funding	3% 2015-20, USAC
Percent of Nebraska **K-12 public school districts** Applying for **Category 1** (External Connections) E-Rate	100% 2019-20, USAC
Percent of Nebraska **K-12 public school districts** Applying for **Category 2** (Internal Connections) E-Rate funding	98% 2015-20, USAC

Nebraska Library Broadband	
Measure	**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
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
Percent of Nebraska Libraries Serving Populations of Less than 2,500 with Internet Access of **100 Mbps or Greater**	.6% FY 2017-2018, Nebraska Library Commission

Appendix 13

Written Comments Received by the Rural Broadband Task Force

As of Oct. 15, 2019

Links to the Rural Broadband Task Force report and comments received are available at https://ruralbroadband.nebraska.gov/reports/index.html .

- Comments received prior to Sept. 2019
- AARP Nebraska Sept. 10, 2019
- Paul Schudel on behalf of 17 Nebraska Rate of Return Carriers Sept. 13, 2019
- Hershey Cooperative Telephone Company Sept. 13, 2019
- Great Plains Communications Sept. 13, 2019
- Hamilton Telecommunications Sept. 16, 2019
- Hamilton Telecommunications Re: Public-Private Partnerships Sept. 16, 2019
- Consolidated Companies Sept. 16, 2019
- Nebraska Central Telephone Company Sept. 17, 2019
- Rural Telecommunications Coalition of Nebraska (RTCN) Sept. 17, 2019
- Nebraska Municipal Power Pool Sept. 17, 2019
- CTIA Sept. 18, 2019
- Nebraska Telecommunications Association Sept. 19, 2019
- NITC Education Council Sept. 19, 2019
- Children's October 3, 2019
- Nebraska Farm Bureau Oct. 3, 2019
- Nebraska Power Association Oct. 8, 2019
- Center for Rural Affairs Oct. 10, 2019
- Nebraska Rural Electric Association Oct. 10, 2019
- Windstream Oct. 10, 2019
- Nebraska Public Power District Oct. 10, 2019
- CenturyLink Oct. 10, 2019
- Nebraska Corn Growers Association Oct. 15, 2019
- Nebraska Cable Communications Association Oct. 15, 2019