



## PRESENTERS

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*Executive Sponsors of Network Nebraska-  
-Education:*

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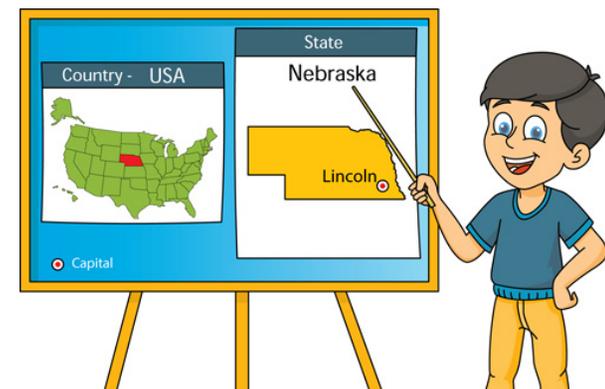
**Website:**

<http://www.networknebraska.net>

(Network Nebraska)

## A little bit about Nebraska:

- 77,358 square miles (16<sup>th</sup> largest)
- 1,907,116 population (24.6 persons/sq. mile—43<sup>rd</sup> in pop. density)
- Cherry County (1 person/sq. mile; larger than states of CT, DE, RI)
- Douglas County (1401 persons/sq. mile; City of Omaha)
- 245 public school districts (319K students; Lynch 51, Omaha 52K)
- 189 nonpublic schools (38K students)
- 268 public libraries
- 1 public university system, 3 state colleges, 6 community colleges, 2 tribal colleges, 14 private colleges
- #4 in high school graduation rate; in the top 5 of ACT test scores
- Unicameral, nonpartisan legislature
- 100% public electrical power
- Sits squarely over the Ogallala Aquifer
- #1 in cattle production (6.6 million head)
- #3 in corn production
- We used to be #1 in college football 😊



## A little bit about Network Nebraska:

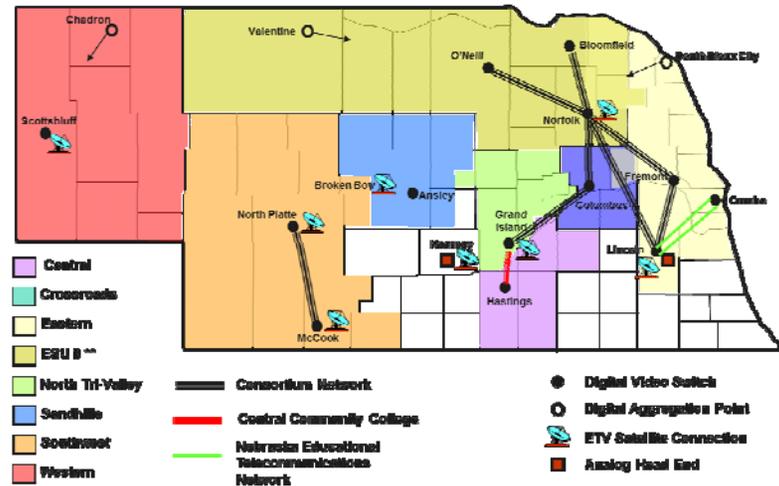
- Created by the Legislature in 2006 to provide distance learning and IVC equipment upgrades to public K-12 districts (39<sup>th</sup> statewide R&E network)
- Ordered the State and University to partner together to manage the network
- Participation would be voluntary and the project would receive no state funding
- Interconnects public and private K-12, and public and private higher education
- Reached 100% public higher ed participation within 4 years and 100% public K-12 participation within 9 years
- Annually carries 400+ video distance ed classes to rural Nebraska
- **No full-time employees**; 20-30 State and University staff work as needed
- Total annual budget of about \$1.6 million for operations, administration, statewide backbone, and statewide Internet
- Charges all entities a flat monthly Participation Fee, regardless of size, bandwidth
- Network model has been shared with 15 other states; NM mimicked legislation

# Pre-Network Nebraska Development

## 1992-2005

- 12 distance ed consortia
- Motion JPEG DS-3s (45M)
- No backbone interconnects
- 1.5Mbps of Internet per school
- Fiber to 90% of districts

**NEBRASKA DISTANCE LEARNING CONSORTIUMS**



\*\* EBU is made up of four consortiums: Niobrara Valley, Learners Academy, North Central, and Northwest Nebraska

(1)

## 2006-present

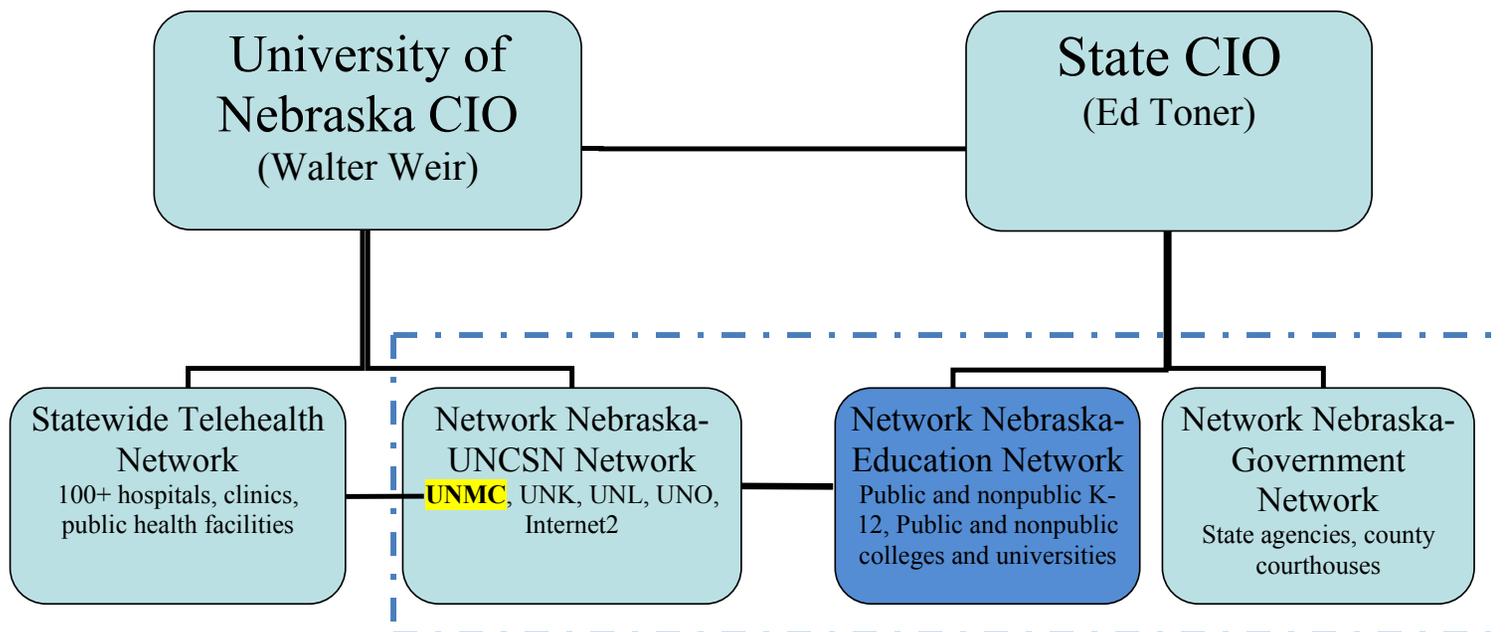
- 1 distance ed clearinghouse
- IP-based statewide network
- 1460-mile backbone
- Unlimited Internet
- Fiber to 99% of districts

**17 EDUCATIONAL SERVICE UNIT AREAS ALL ON ONE CONTIGUOUS IP NETWORK**





- (N.R.S. 86-5,100) The Chief Information Officer, in partnership with the University of Nebraska, shall develop and maintain a statewide, multipurpose, high capacity, scalable telecommunications network to be called **Network Nebraska**. The network shall consist of contractual arrangements with providers to meet the demand of state agencies, local governments, and educational entities as defined in section 79-1201.01. *(LB 1208—2006 Session)* (“Network Nebraska” is shown inside the dotted lines)

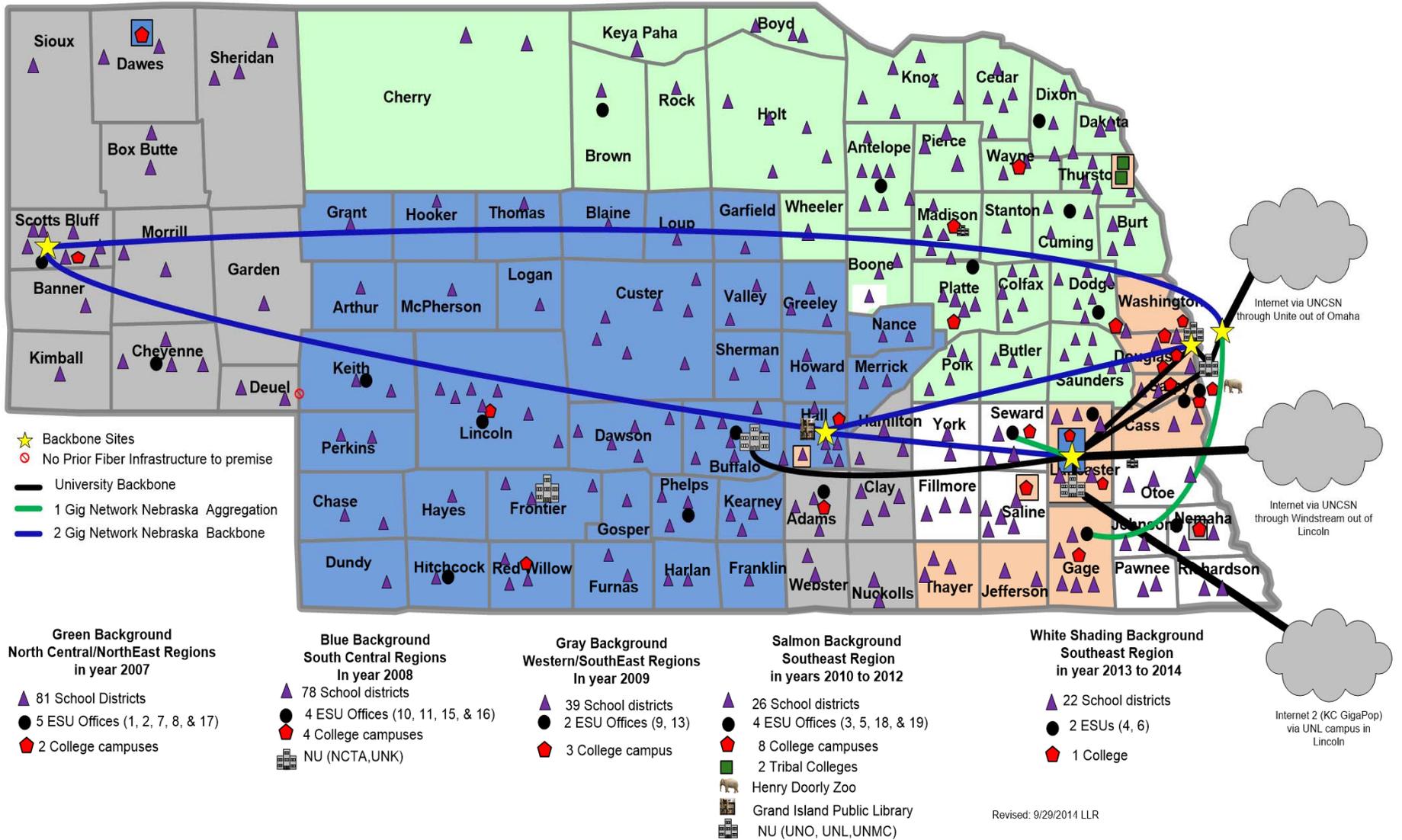




- **What is Network Nebraska?**

- A statewide consortium of 291 education entities working together to improve their telecommunications services and lower costs;
- A statewide, self-funded network consisting of a 1,460-mile 2Gbps-10Gbps backbone carrying upwards of 70Gbps of Internet;
- Daily serving over 325,000 K-12 students and over 100,000 higher education students;
- Managed by the State of Nebraska Office of the CIO, in partnership with the University of Nebraska, with guidance from the Network Nebraska Advisory Group, Collaborative Aggregation Partnership, and the NITC.

# Network Nebraska-Education 2016-17





- **Network Nebraska-Education  
7/1/2016 Participants (291)**

- 245 public school districts (100%)
- 17 Educational Service Units (100%)
- 1 public university (100%)
- 3 state colleges (100%)
- 6 community colleges (100%)
- 2 tribal colleges (100%)
- 7 nonpublic colleges (50%)
- 39 nonpublic schools (21%)
- 2 public libraries (1%)
- 1 municipality (.2%)

- **Network Nebraska-Education  
POTENTIAL Participants (446)**

- 7 nonpublic colleges
- 150 nonpublic schools
- 266 public libraries
- 531 municipalities



- **Network Financing** can be broken out into 5 separate categories:
  1. **Administration & Operations** [Participation Fee]
  2. **Statewide backbone transport** [Interregional Transport Fee]
  3. **Internet access** [Commodity and Peering rates]
  4. **Wide Area Network or middle-mile + last-mile** [Layer 2 Transport Costs]
  5. **Subscription services** [cloud videoconferencing, DDoS, network monitoring, traffic shaping, etc...]



1. Administration & Operations; [Participation Fee of \$217.47/month/entity = \$743K/year]

- |   |        |
|---|--------|
| A. Equipment                                | \$223K |
| B. Equipment Maintenance                    | \$125K |
| C. Software & Maintenance                   | \$ 12K |
| D. NU, NDE, Staff Support                   | \$245K |
| a. Helpdesk, engineering, technical support |        |
| E. Miscellaneous                            | \$ 58K |
| F. State of NE Shared Services              | \$ 80K |
| a. Accounting, legal, procurement, billing  |        |

## Administrative Support (OCIO)

- Communication with Participants
- E-rate Filing and Applicant Support
- Procurement of Circuits and Internet Access
- Accounts receivable & payable
- Membership Records & E-rate Archiving
- Cost recovery rates
- Legal Services
- Web Support
- Governance
  - Staff arrange Collaborative Aggregation Partnership (CAP) monthly meetings, and attend Network Nebraska Advisory Group (NNAG) bimonthly meetings, ESU-NOC quarterly meetings



## Operational Support (NU)

- Network Engineering
  - Network management, change management, core routers and switches, routing, intrusion detection and prevention, traffic shaping, provider handoffs, management of core network facilities (6), bandwidth projections, researching new services and technologies, RFP assistance
- Technical Support/Helpdesk
  - Diagnosing and resolving issues with participants and providers, 24x365 helpdesk, 1-888-NET-NEBR
- Alert System
  - Communicating internally and externally scheduled network maintenance and unplanned outages
- Governance
  - Staff attend CAP, NNAG, NOC meetings



2. **Statewide Backbone Transport** [Interregional Transport Fee of \$22.00/month for 270 K-12 entities + \$67.16/month for 21 Higher Ed entities = \$234K\*/year]

- A. Long-haul lit and dark fiber circuits      \$117K
- B. Aggregation circuits to ESUs                      \$117K

*(\*E-rate is \$146K of the \$234K)*

NOTE: The Statewide Backbone is comprised of 6 leased lit circuits, 8 dark fiber circuits, extending over 1,460 miles, from 2Gbps to 20Gbps in capacity, depending on the circuit.



### 3. Internet Access [Commodity and Peering expenditures = \$289K\*/year]

a. 18 Gbps x \$ .86/Mbps/month = \$172,800

b. 12 Gbps x \$ .69/Mbps/month = \$ 99,500

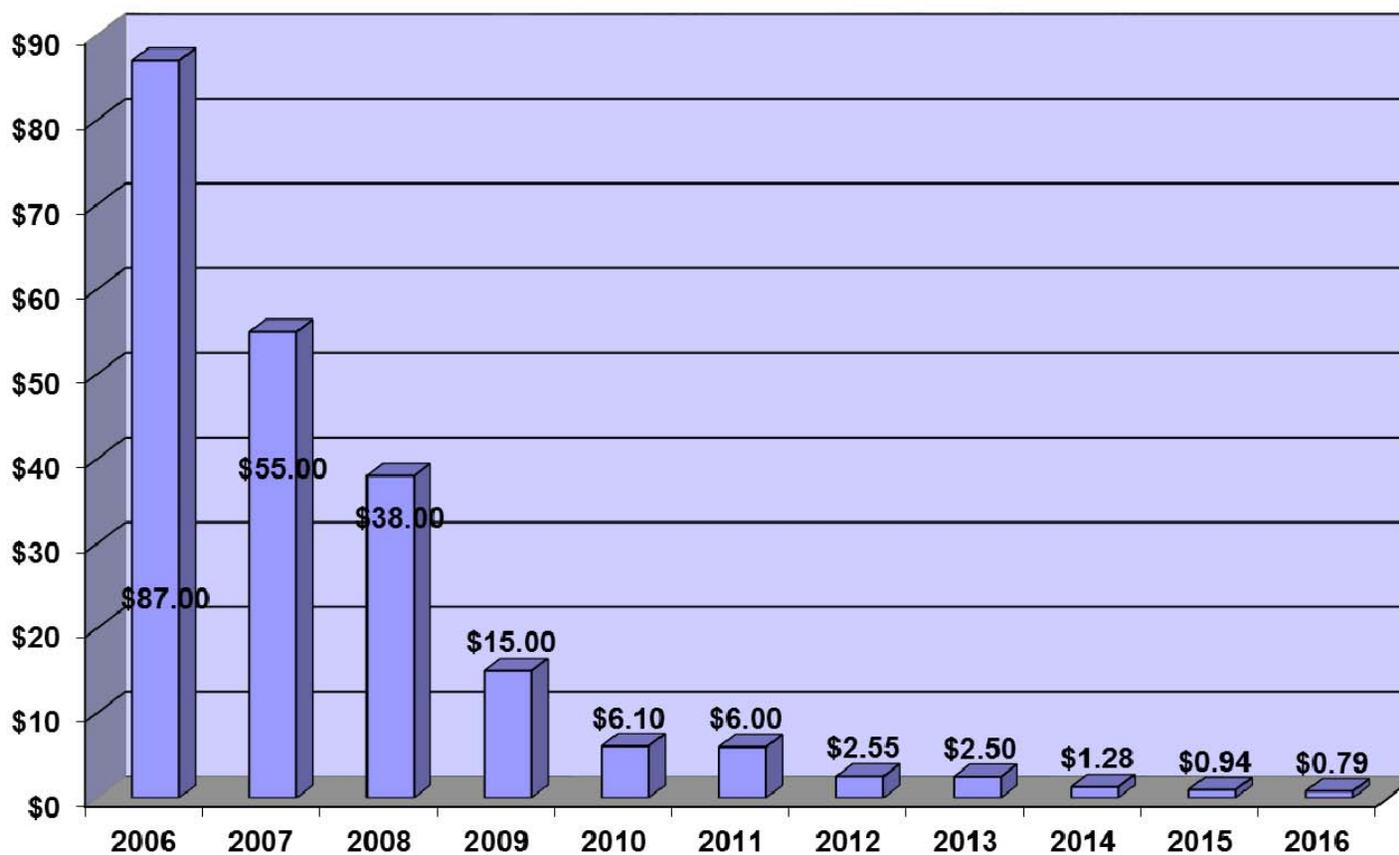
c. 10 Gbps x \$ .09/Mbps/month = \$ 9,000

d. 20 Gbps x \$ .03/Mbps/month = \$ 7,200

(\*E-rate is \$143K of the \$289K)



**Network Nebraska Internet Access Cost  
(Average \$\$ per Mbps/month)**





## 4. Wide Area Network or middle-mile + last-mile Circuits

- A. About 290 K-12, 50 higher ed, 50+ county extension, and 9 library fiber circuits connect to Network Nebraska
- B. The State of Nebraska Purchasing Bureau bids and contracts for over 80% of these circuits
- C. Network Nebraska involves over 20 different Nebraska telecommunications companies, with **NebraskaLink** being the largest provider.



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Nebraska@Link

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Nebraska@Link  
*Nebraska's Broadband Network*

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## Who is NebraskaLink...

- NebraskaLink was formed through a partnership of seven Nebraska Telecommunications companies to provide broadband transport services across Nebraska.
- NebraskaLink's mission is to promote economic growth in the public and private sectors by offering competitive pricing, diversified routing, and redundant facilities to local carriers, Internet service providers, key businesses, and public and private institutions.
- NebraskaLink has constructed a state of the art fiber optic network throughout Nebraska using new and existing infrastructure.

## 2010 BTOP Award

- **NebraskaLink, LLC**
- **Connecting Nebraska Communities**
- *NebraskaLink, a partnership between seven local telecommunications providers, proposes to deploy a high-speed, middle mile fiber-optic network across nearly the entire state of Nebraska. The proposed Connecting Nebraska Communities' nearly 2,000-mile network, including 450 miles of newly constructed fiber in western Nebraska, will serve community anchor institutions as well as at least 23 last-mile broadband providers that have expressed an interest in using the network to provide local consumer service, improving access to public safety entities, schools and community colleges, healthcare facilities, and libraries.*

*From NTIA grant project  
profile 2010*

## Immediate Grant Results

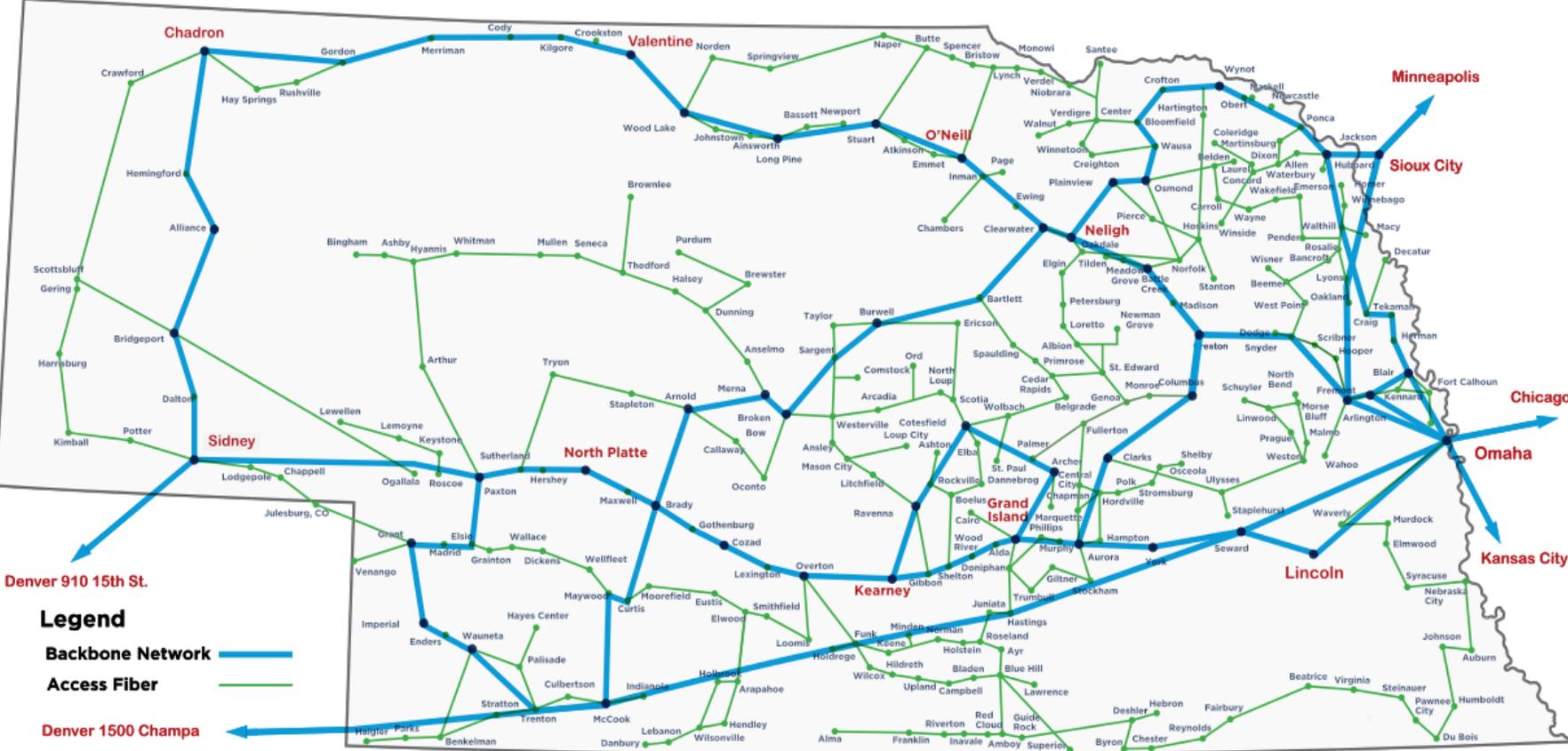
- Successful grant completion and closeout in 2014
- Connected 100+ Community Anchor Institutions by 2013
- Installed over 500 miles of fiber
- Connected 1,500 miles of existing fiber
- Reached 100+ individual communities

## NebraskaLink Network Today

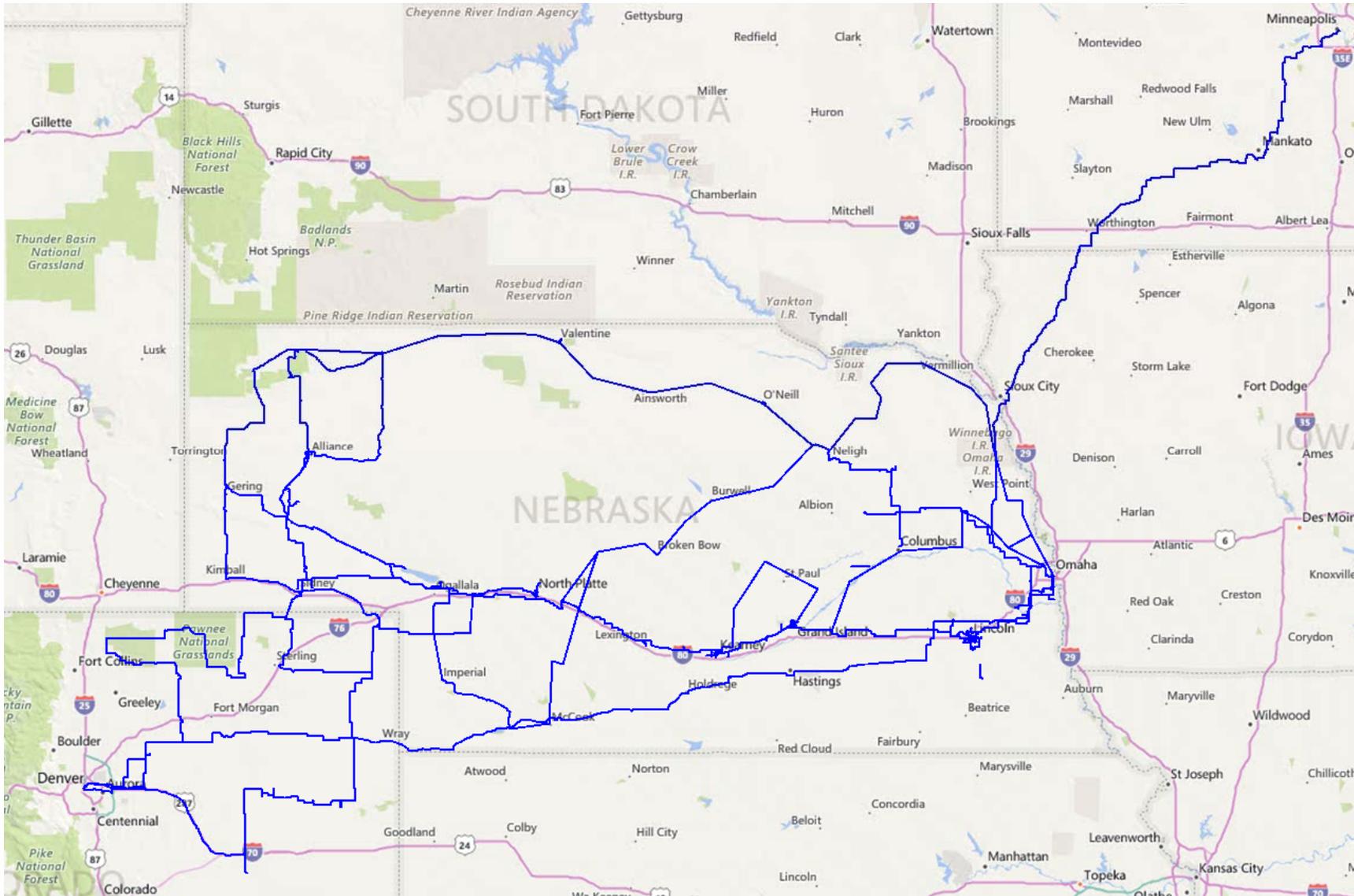
- 200+ Community Anchor Institutions connected
- 4000+ Route miles of fiber network
- 1000+ Miles of newly constructed fiber \*5 years or less
- Connectivity to metro centers outside Nebraska
  - Denver, Minneapolis, Chicago and Kansas City
- 125+ Communities served
- 5500+ Lit and near net unique locations

# NebraskaLink

Nebraska's Broadband Network



# NebraskaLink Backbone Network 2017



## NebraskaLink Takeaways

- Creating partnerships and interconnects with other last and middle mile companies, NebraskaLink has been able to improve the resiliency and reliability of fiber connections statewide.
- Factors including the BTOP grant award, aggressive new fiber infrastructure builds, and very competitive bidding, NebraskaLink has become Network Nebraska's largest Wide Area Network provider, with over 100 Layer 2 WAN circuits and 3 state backbone circuits.
- Providing reliable and affordable connectivity in rural areas, we have been able to increase bandwidth and lower costs to rural community anchor institutions. NebraskaLink's profitability as a company has allowed further expansion to previously underserved institutions.

## Network Nebraska Partnership

- Network Nebraska provides state master contract bidding opportunities that has enabled NebraskaLink to bid strategically for more business opportunities and to compete based on greatest reliability and lowest cost.
- There is an intrinsic value to providers and to participants when an entire state's community anchor institutions organizes itself into a single statewide network.
- NebraskaLink looks forward to future business opportunities with Network Nebraska, and to serve the state's community anchor institutions.



## 5. Subscription Services

- A. Most Network Nebraska services outside of Internet Access and cloud videoconferencing are “one for all, all for one” (a.k.a. paid for by all, able to be used by all)
- B. The next growth area for Network Nebraska will be new application layer services and aggregated purchasing of existing services.



## **E-rate: Who bids? Who files? Who gets billed? Who pays the undiscounted portion?**

| Type of Service                           | Who bids and contracts?                    | Who files E-rate?        | Who is the billed entity? | Who pays the balance?    |
|---|--|--------------------------|---------------------------|--------------------------|
| <b>Local Inter-campus circuits</b>        | K-12 schools & Libraries                   | K-12 schools & Libraries | K-12 schools & Libraries  | K-12 schools & Libraries |
| <b>Transport Circuits to the backbone</b> | State of Nebraska/K-12 schools & Libraries | K-12 schools & Libraries | K-12 schools & Libraries  | K-12 schools & Libraries |
| <b>Statewide backbone</b>                 | State of Nebraska                          | State of Nebraska        | State of Nebraska         | K-12 schools & Libraries |
| <b>Statewide Internet</b>                 | State of Nebraska                          | State of Nebraska        | State of Nebraska         | K-12 schools & Libraries |



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