



- Nebraska Public Service Commission Workshop, Tuesday, 3/17/2015
- A briefing on Network Nebraska-Education & E-rate Modernization
- Presented by Tom Rolfes, Education I.T. Manager, Office of the Chief Information Officer, State of Nebraska

Talking Points

- Brief History
- Current Status
- Future Development
- E-rate Modernization
- Other Community Anchor Institutions

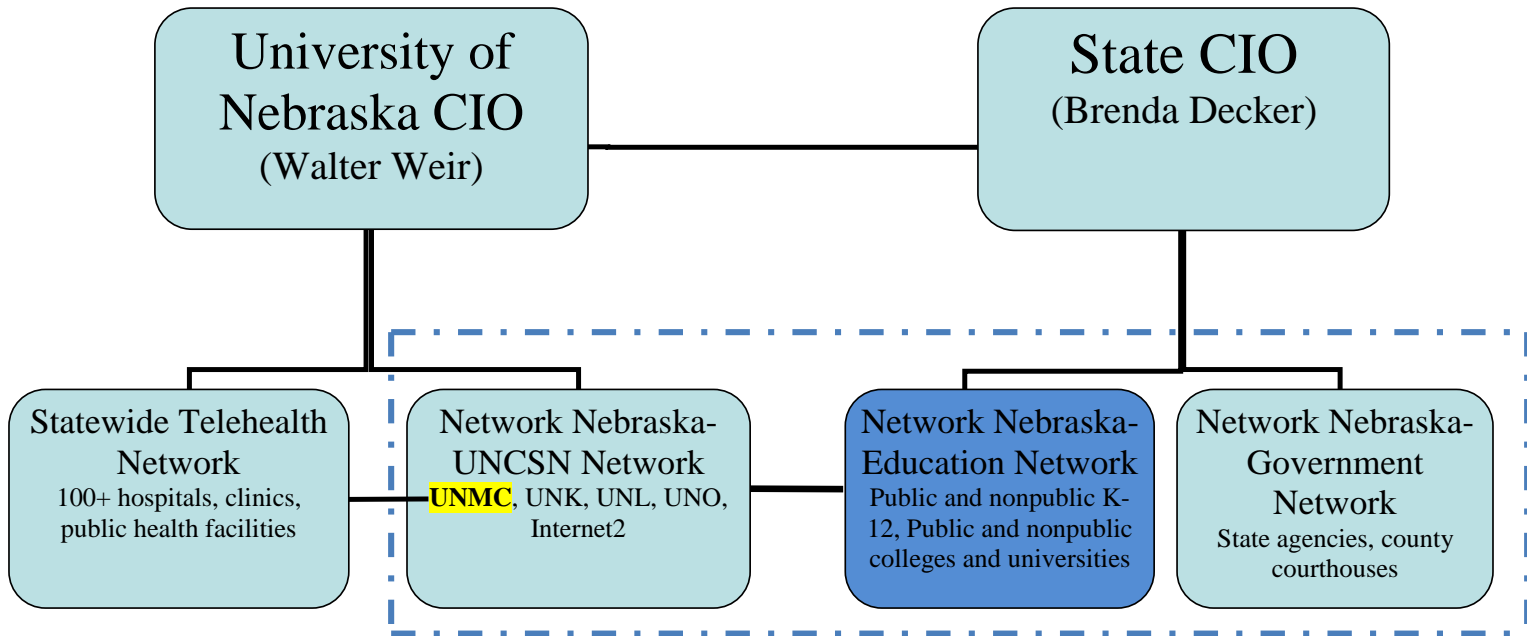


- **What is Network Nebraska?**

- A statewide consortium of 288 education entities working together to improve their telecommunications services and lower costs;
- A statewide, self-funded network consisting of a 1,293-mile 2Gbps-10Gbps backbone carrying between 20Gbps and 30Gbps of Internet;
- Serving over 300,000 K-12 students and over 100,000 higher education students;
- Managed by the State of Nebraska Office of the CIO, and assisted by the University of Nebraska, with guidance from the Network Nebraska Advisory Group, Collaborative Aggregation Partnership, and the NITC.



- (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)





- **How did we get here?**

- Impetus: (2005) K-12 distance learning coordinators convinced the Nebraska Legislature that it needed to take action or K-12 schools “were going to go dark”.
- Interim Study: (2005) Legislature convened a study committee for 6 months to examine the issue.
- LB 1208: (2006) Legislative bill enacted policy, funding, coordination, and network management changes.
- Growth: (2007-2012) By July 1, 2012, 100% of public higher ed and 89% of public K-12 were on the network.
- Maintenance: (2013-present) Participants explore and recommend applications and services.



K-12 networking, before and after LB 1208 (2006)

1992-2005

- 12 distance education consortia (“pods”)
- Analog & Motion JPEG DS-3s
- No backbone interconnects
- 1.5 – 3.0 Mbps Internet per school
- Fiber to 90% of districts

2006-present

- 1 distance education clearinghouse
- IP-based statewide network with 300+ Ethernet WAN circuits
- 1293-mile MPLS backbone
- Completely scalable Internet; total statewide purchase 25Gbps
- Fiber to 99.2% of districts



- **How did NN develop a cost recovery system?**
 - 1. Separated all E-rate eligible services from non-E-rate services and established 3 different fund accounts.
 - Participation Fee, Interregional Transport Fee, Internet Access
 - 2. Considered fees based on student population, amount of bandwidth, number of entities, and hybrid approach.
 - Settled on “1 entity, 1 fee” approach, regardless of size of entity or amount of bandwidth
 - 3. Established a monthly billing/re-billing system through the State Office of the CIO.
 - University of Nebraska and vendors bill the OCIO and the OCIO recovers costs from each Participant
 - 4. The Network Nebraska Advisory Group continually reviews, monitors, and recommends changes to the cost recovery system



- **How did NN address control vs cooperation with the school, ESU and college networking staff?**
 - 1. Described a vision that included cooperative management and some decentralization of network monitoring, and we “stayed on message”.
 - 2. Kept Network Nebraska’s management team extremely small and didn’t go where NN staff weren’t asked.
 - 3. Attended lots of out-state and ESU meetings.
 - 4. In 2009, chartered the Network Nebraska Advisory Group to advise the State CIO on network decisions.
 - 5. Shared all of NN’s network management tools with every technician who asked for access.



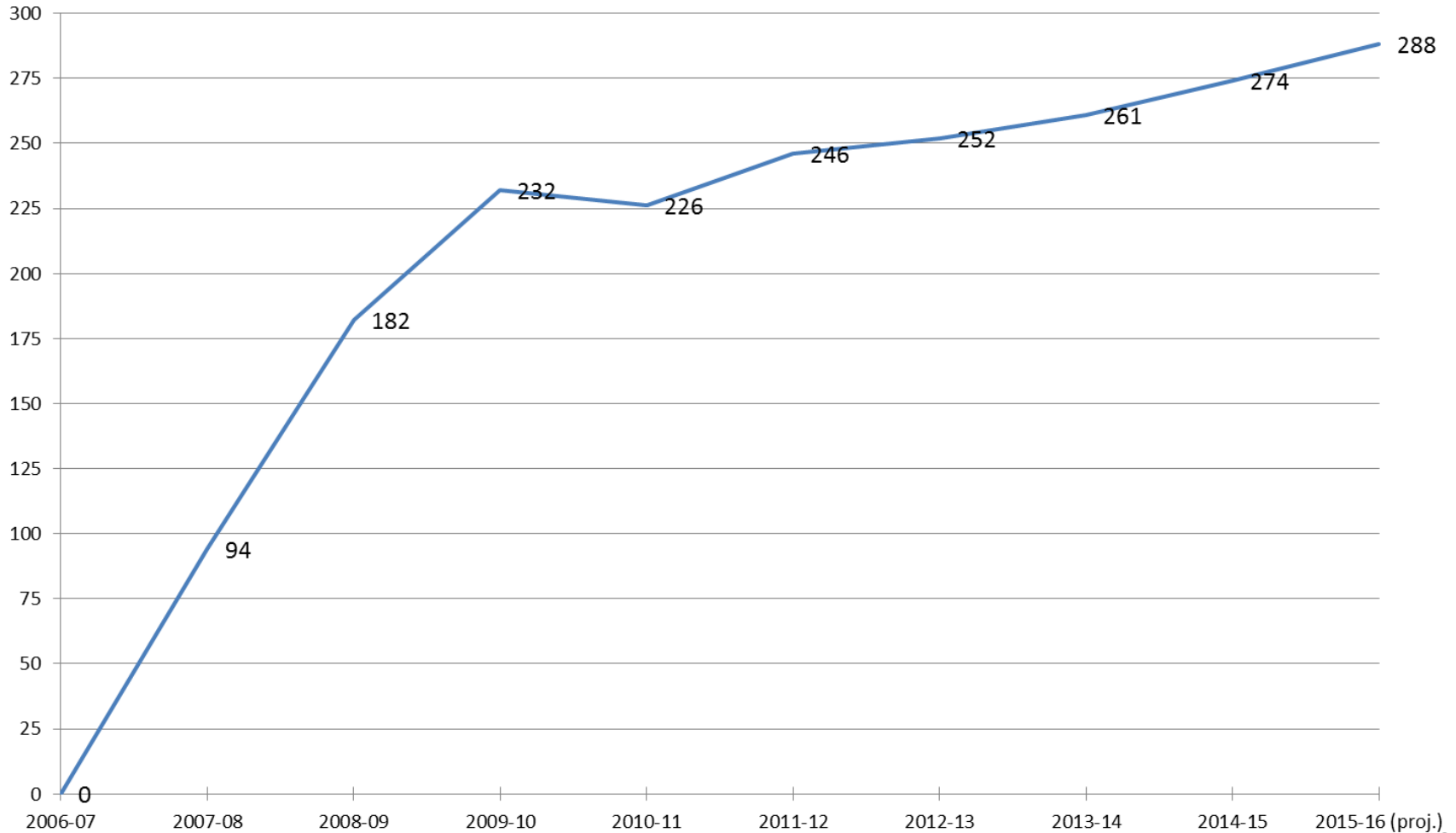
- **How has NN gotten so many entities to join?**
 - 1. The lottery incentives helped ease the financial burden to belong (e.g. 3 D.L. classes, \$3,000 > NN costs, \$2,700)
 - 2. Reinforced that the network belonged to the participants, not the State or the University
 - 3. Achieved a dramatic reduction in Internet costs
 - 4. “Total transparency” of complete financial information, budgets, contracts, agreements, etc...
 - 5. Aggregated demand and shared backbone services demonstrated that a large group of unlike entities can be successful when they all agree to work together



- **Connectivity Expectations for each NN Participant**
 - Pay for WAN circuit to reach a Network Nebraska aggregation point:
 - Scottsbluff-Panhandle Research Center
 - Grand Island-College Park
 - Lincoln-Nebraska Hall
 - Omaha-Peter Kiewit Institute
 - Omaha-Nebraska Co-Location Center
 - Or Sub-aggregation point:
 - LaVista-ESU 3
 - Beatrice-ESU 5
 - Milford-ESU 6



Network Nebraska-Education Membership by Year





- **Network Nebraska-Education
7/1/2015 Partners (288)**

- 246 public school districts (99.6%)
- 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%)
- 6 nonpublic schools (3%)
- 1 public library (<1%)

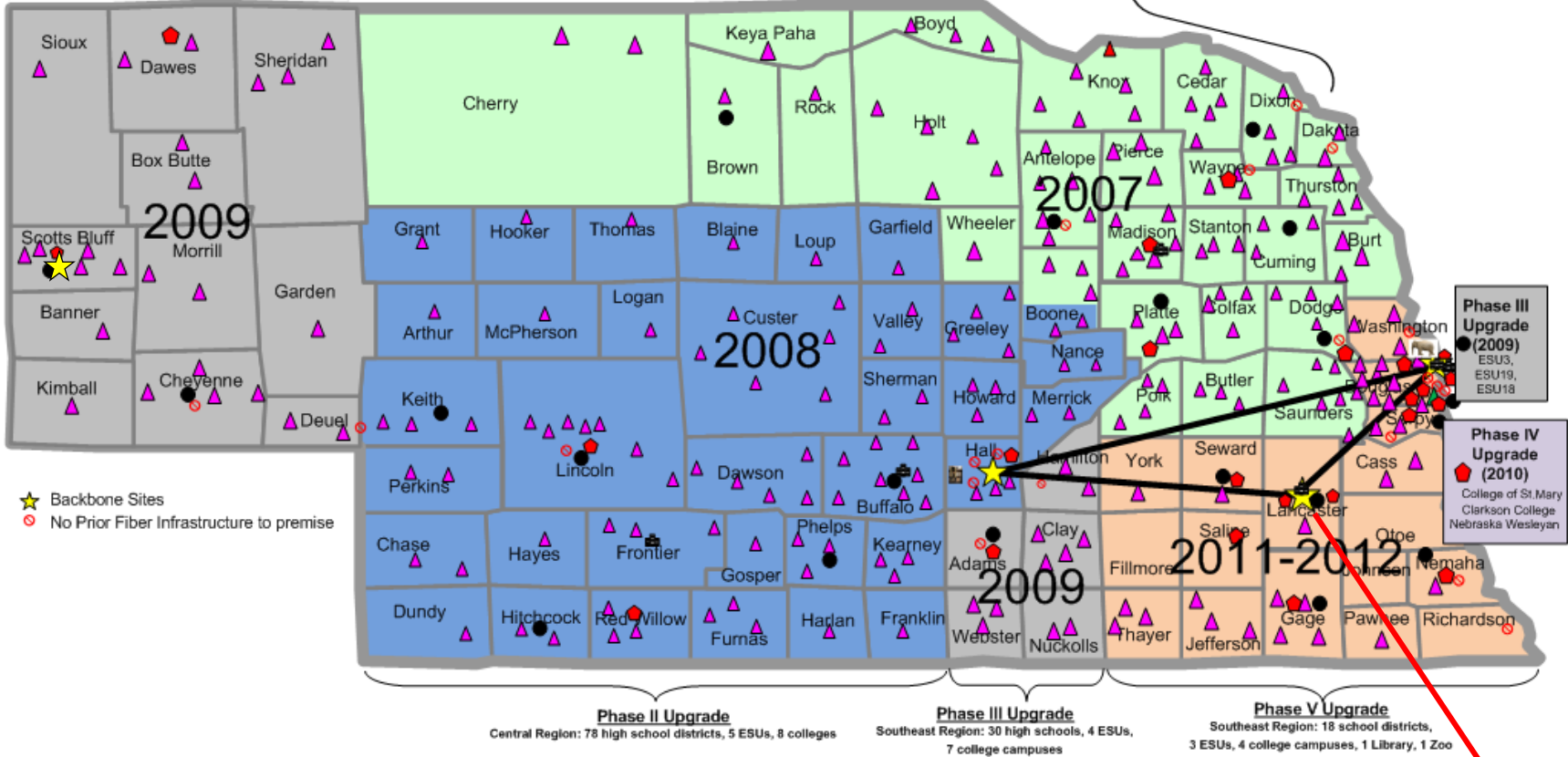
- **Network Nebraska-Education
POTENTIAL Partners (482)**

- 1 public school district
- 7 nonpublic colleges
- 207 nonpublic schools
- 267 public libraries

Network Nebraska-Education Map by Year

Phase III Upgrade
Panhandle Region: 23 high school districts,
2 ESU offices, 1 college campus

Phase I Upgrade
Green Shading of Northeast Region:
87 high school districts, 5 ESUs, &
2 college campuses



★ Backbone Sites
○ No Prior Fiber Infrastructure to premise

Phase I – Green Shading on Counties
North Central/NorthEast Regions 2007

- ▲ 87 School Districts
- 5 ESU Offices (1, 2, 7, 8, & 17)
- ◆ 2 College campuses
- NU (UNO, UNL, UNMC, UNK)

Phase II – Blue Shading on Counties
South Central Regions 2008

- ▲ 78 School districts
- 4 ESU Offices (10, 11, 15, & 16)
- ◆ 7 College campuses
- 1 NU (NCTA)

Phase III – Gray Shading on Counties
Western/SouthEast Regions in 2009

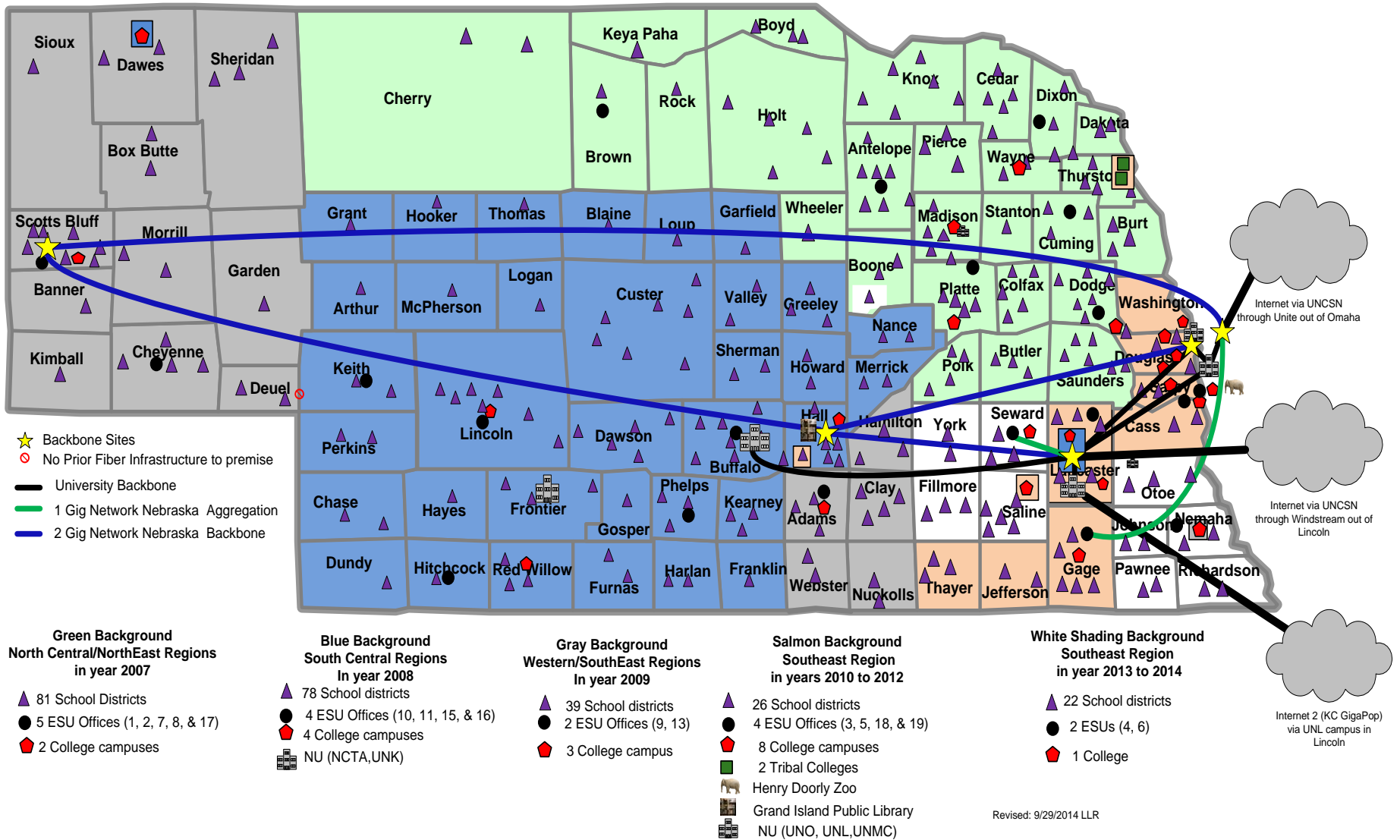
- ▲ 42 School districts
- 6 ESU Offices (3, 9, 13, 14, 18, & 19)
- ◆ 8 College campuses

Salmon Shading on Southeast Region (2011-2012)

- ▲ 18 School districts
- 3 ESU Offices (4, 5, & 6)
- ◆ 4 College campuses
- Henry Doory Zoo
- Grand Island Public Library

Internet2
(K.C. GigaPop)

Network Nebraska – Education 2014





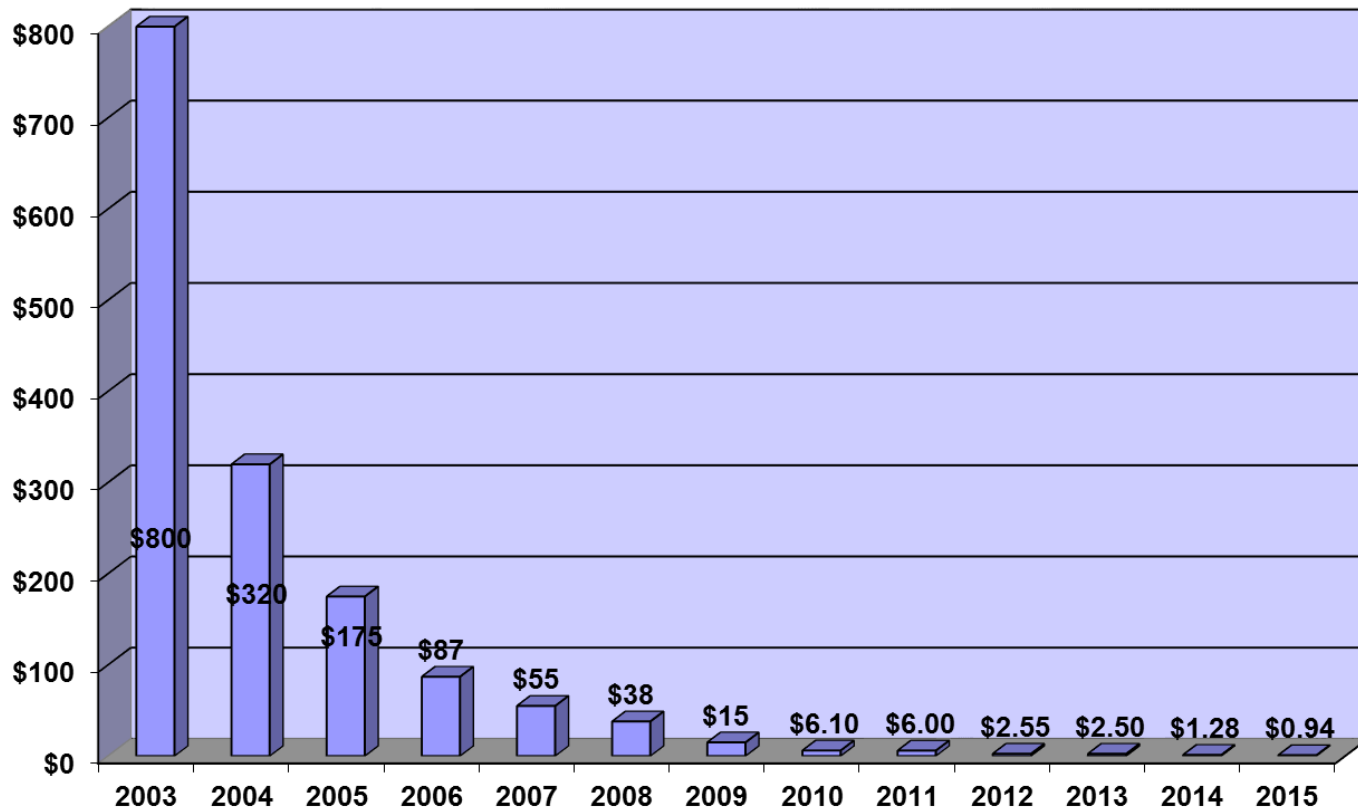
- **Major Roles for Network Nebraska-Education**
 - Network management & infrastructure
 - Bidding for WAN circuits, backbone, Internet, and equipment
 - E-rate filing (backbone & Internet)
 - Accounting, legal, purchasing, budgeting
 - Vendor relations, contracting and billing issues
 - Data center co-location for Participant equipment
 - Sponsor training events (e.g. E-rate, technical, security, disaster recovery)



- **Network Nebraska-Education**
 - **\$1.3M Budget (2014-15)**
 - \$700K for infrastructure maintenance and support
 - \$190K for backbone
 - \$325K for Internet access
 - **Statewide Backbone (2014-15)**
 - 1293 miles
 - 2 Gbps
 - 5 major & 3 minor aggregation points
 - carrying up to 30 Gbps of Internet
 - **Completely self-funded by the 288 participants**

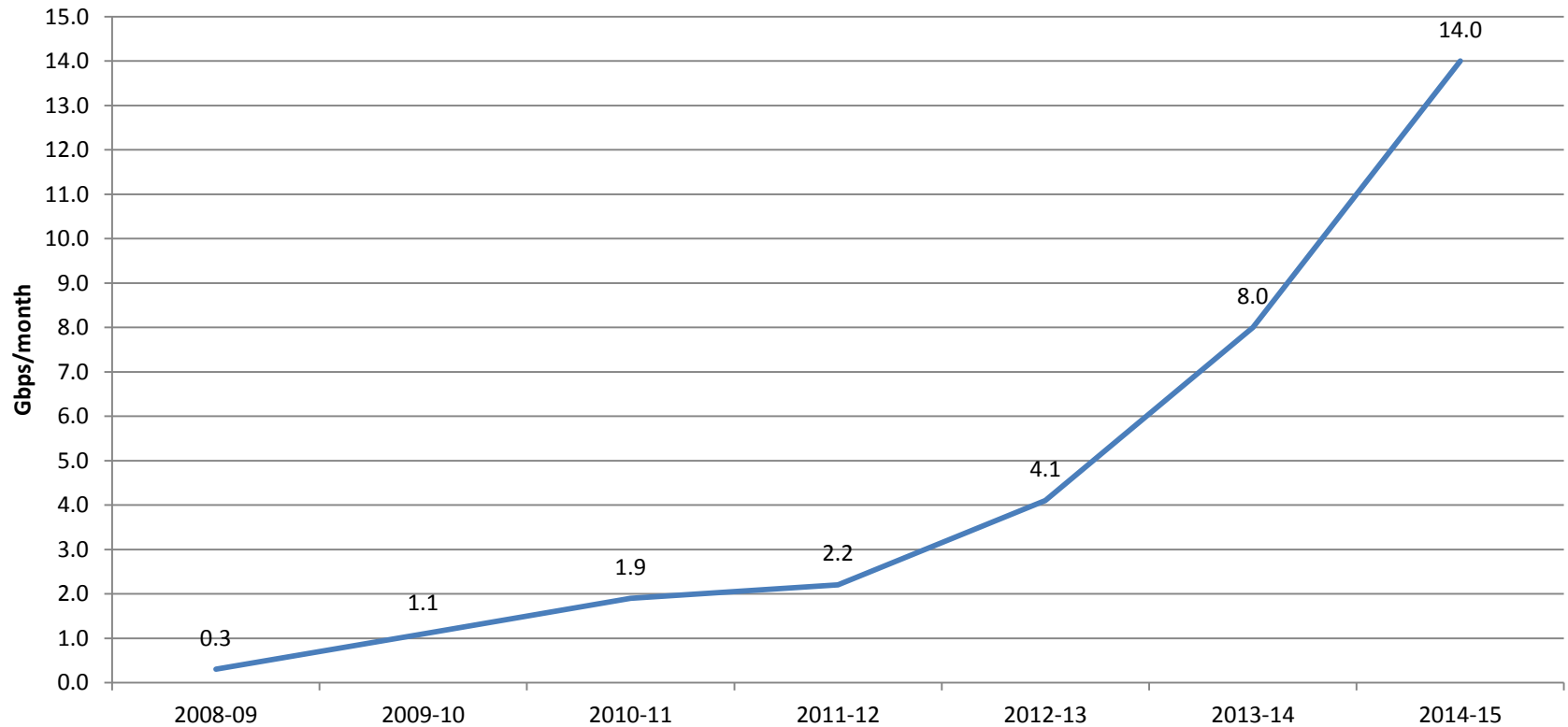


**Network Nebraska Internet Access Cost
(Average \$\$ per Mbps/month)**





Amount of Internet Bandwidth Purchased by Network Nebraska- Education **K-12** Participants (in Gbps/month)





- **A look to the future...**

- Participation by public K-12 and public higher education entities expected to reach nearly 100% by 7/1/2015
- Traffic shaping, Intrusion Prevention, and Commercial Peering Services were recently implemented
- More educational applications (e.g. online testing, digital textbooks, cloud services) requiring much more bandwidth
- Online testing to achieve 100.0% up time
- Some backbone segments will need to increase from 2Gbps to much higher capacity (5Gbps-10Gbps)
- Internet access continues to increase about 80% per year
- Dynamic provisioning of Internet will provide about \$100K per year of cost avoidance, applicable to other technology costs



E-rate Modernization



Federal
Communications
Commission

- **Major changes (Part 1)**

- FCC wants every school to have an external connection of at least 100Mbps per 1,000 students by 2015 and 1000Mbps per 1,000 students by 2018; and 10Gbps between school district buildings
- FCC will more aggressively enforce the Lowest Corresponding Price (LCP) rule
- Priority 2 funding becomes Category 2 (C2) funding and allows for an internal connections project budget of \$150/student over five years, less the school district's E-rate discount (Nebraska = \$~56 million)
- C2 funding will focus on WiFi and be able to pay for routers, switches, wireless access points, internal cabling, racks, wireless controller systems, firewall services, uninterruptable power supplies, and the software to control the wireless access points
- C1 funding for voice service, voicemail, VOIP, e-mail, and web hosting will abruptly or gradually be phased out



E-rate Modernization



Federal
Communications
Commission

- **Major changes (Part 2)**

- FCC will make circuit speeds and bandwidth costs totally transparent from the USAC website starting in FY 2015
- FCC plans to designate nationwide Preferred Master Contracts so that schools and libraries will not have to bid C2 equipment, but may bid C2 installation, wiring, and basic maintenance locally or by consortia
- Consortium applications will be streamlined and expedited
- The definition of “rural” will be updated from the 2010 U.S. Census
- Starting in FY 2016, entities who pay the full cost of their services will be able to get direct reimbursement through USAC, instead of through their service provider
- FCC plans to raise the profile of the E-rate program to tribal schools and libraries
- The document retention period for applicants, providers, consortium leads and bidders has been extended from 5 to 10 years



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?
Local campus circuits	K-12 schools & Libraries	K-12 schools & Libraries	K-12 schools & Libraries	K-12 schools & Libraries
WAN Circuits to the backbone	State of Nebraska/K-12 schools & Libraries	K-12 schools & Libraries	K-12 schools & Libraries	K-12 schools & Libraries
Statewide backbone	State of Nebraska	State of Nebraska	State of Nebraska	K-12 schools & Libraries
Statewide Internet	State of Nebraska	State of Nebraska	State of Nebraska	K-12 schools & Libraries



- **Nebraska Community Anchor Institution Participation as defined by Internet2 U.S. UCAN**
 - **K-12 public & private schools, ESUs** = reaching 100% public entity participation through [Network Nebraska-Education](#)
 - **2-year technical colleges** = 100% through [Network Nebraska-Education](#)
 - **4-year public and private colleges** = 72% through [Network Nebraska-Education](#)
 - **Public libraries** = < 1% through [Network Nebraska-Education](#)
 - **Local & County Government** = Access through OCIO Network
 - **Hospitals, Clinics** = Access through Nebraska State Telehealth Network
 - **Public Safety Entities** = Access through OCIO Network
 - **Museums/Science Centers/Zoos** = No direct access provided; but entities can partner with [Network Nebraska-Education](#) members



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<http://www.networknebraska.net> (Network Nebraska)