

Broadband in Rural Schools and Libraries

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Overview of Wisconsin Broadband

Wisconsin Department of Public Instruction believes:

- All schools (public and non-public) and libraries should have choices in selecting Transport (circuit) and Transit (Internet access) providers;
- Competition creates more value at less cost to select from including commercial and public options in every community.

Badgernet Converged Network (BCN)

- Wisconsin's statewide network
- Serves over 2,100 entities in all 72 counties
 - State and local government
 - Public and non-public K-12 and higher ed institutions
 - Public libraries
- BCN provides wide area network, internet transport (circuits), and video circuits/applications to state/local government and educational entities.

Technology for Education Achievement (TEACH)

- State program that subsidizes cost of BCN broadband circuits to ~880 schools and libraries
- DOA currently negotiating new contract
 - Goal: Significantly reduce broadband rates for all BCN customers. \$1/Mbps

Federal E-rate Program

- Schools and libraries universal service support program, more commonly known as E-rate. Implemented by the FCC in 1997.
- E-rate Modernization Order in 2014 increased E-rate funding, put more focus on internal connections (wireless)

Public Libraries

- Using Aspen Report for strategic direction
- ILEAD USA and future initiatives
- Computer usage vs. wireless in libraries
- Testing checking out wireless hotspots
- Coding initiative

Public Libraries - Broadband Uses

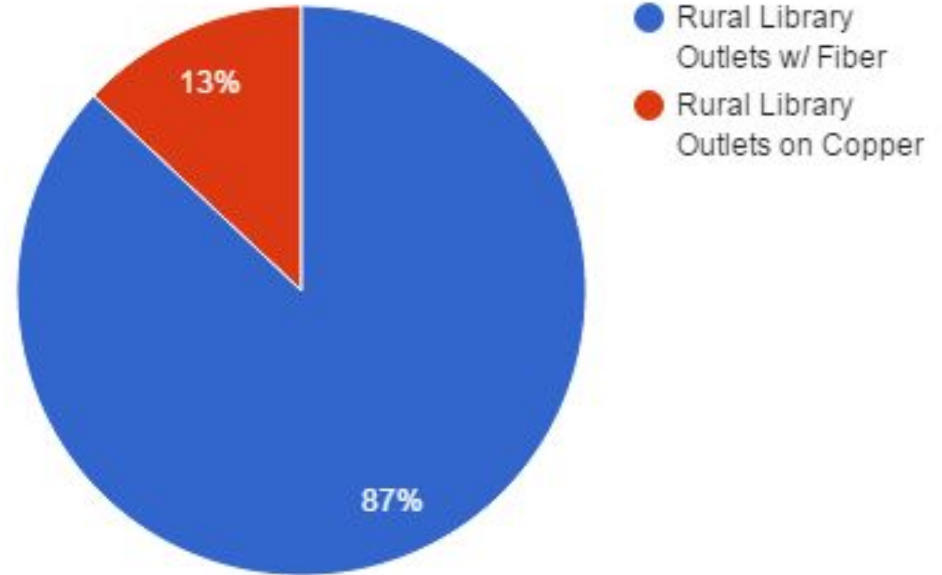
- Offering Gale Courses - over 300 online six week instructor-led classes monthly
- JobNow - resume review and interview coaching
- Skype for job interviews
- Provide access to Lynda.com and Tutor.com

Public Libraries - Fiber

- 2014 DOA and DPI led Library Fiber Project.
- TEACH program used \$4 million to install fiber in nearly 350 library locations
- Libraries got a 10Mbps BadgerNet connection for \$100/mo and up to 100Mbps for \$250/mo
- Library speeds:
 - Before - 33 libraries on BCN had speeds at least 10Mbps
 - After - 303 libraries on BCN have speeds at least 10Mbps
 - Before - 8.5% public libraries had speeds >10Mbps
 - After - 33% public libraries have speeds >10Mbps

Public Libraries - Fiber

- We are closing the fiber gap in rural public libraries, but still have a few left



Public Libraries Internet PC vs Wireless

In many communities the public library is the best option for connectivity. While the use of internet PCs in public libraries is trending downward the past couple years, the wireless use is increasing at a high rate.

Public Libraries Internet PC vs Wireless

2013-15 Wifi and PC Uses at Rural Libraries that reported (51 libraries):

| | 2013 | 2014 | 2015 |
|------------------------------|---------|---------|---------|
| Wireless internet use | 658,521 | 678,491 | 867,623 |
| PC internet use | 351,915 | 320,485 | 279,382 |

Public Libraries

Internet PC vs Wireless

2015 Wifi and Internet PC uses at rural libraries that reported both (111 libraries):

| | | |
|------------------------------|----------------|---------------------|
| Wireless internet use | 1,455,746 uses | 270% of PC use |
| PC internet use | 539,497 uses | 37% of wireless use |

FCC Bandwidth Target

FCC Benchmark for libraries

Libraries that serve fewer than 50,000 people have broadband speeds of at least 100 Mbps.

Libraries that serve 50,000 people or more have broadband speeds of at least 1 Gbps.

Rural School Broadband: Themes

1. Broadband challenges special to rural schools
2. Surge in bandwidth demand
3. Bandwidth options for schools, and competition
 - a. TEACH, Badgernet, and other providers
4. Many elements needed after broadband connection
5. TEACH and E-rate have evolved in recognition of this
6. Residential access is a major problem

Rural Schools

Why Rural Broadband?

- Bring diverse and advanced learning resources that might otherwise not be available into the hands of every student
- Personalize learning, including distance learning

Required Components: Broadband is only Step 1

1. Fast connection from the Internet to the building
2. Robust network within the school, including wireless
3. Mobile devices, whenever/wherever needed
4. Ample professional development
5. Home access for every student

Bandwidth: demand is exploding

FCC Benchmark for schools

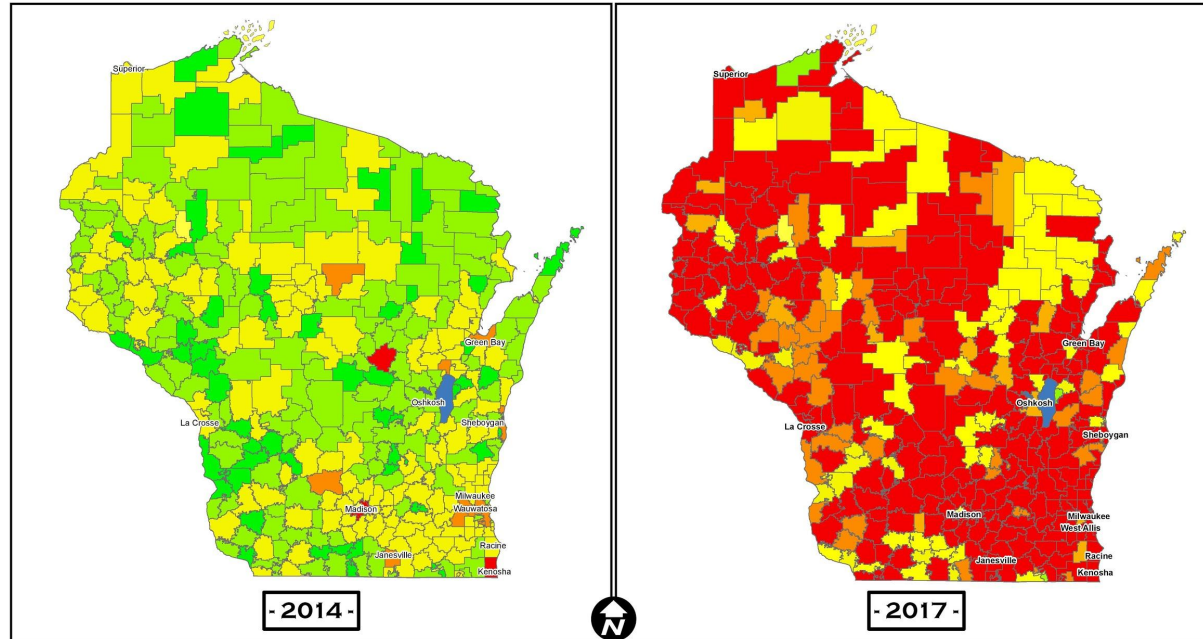
2014-2017: 100K per student

2017 and beyond: 1M per student (10x more)

FCC Benchmark for residences, beginning 2015: 25M per residence

Bandwidth: demand is exploding

21ST CENTURY K12 CONNECTIVITY HEALTH REPORT



CONNECTED HEALTH METER



January 2013 Mapping, courtesy of:



Example: Bayfield School District

Growing Demand

| School | Students | Bandwidth Needed 2014-17 | Badgernet Supply 2016 | Bandwidth Needed 2017 | Badgernet Supply 2017 |
|-------------|----------|-----------------------------|--------------------------|-----------------------------|--------------------------|
| Bayfield ES | 159 | 16 Mbps | 0 | 160 Mbps | ? |
| Bayfield MS | 101 | 10 Mbps | 0 | 100 Mbps | ? |
| Bayfield HS | 117 | 11 Mbps | Up to 100 Mbps | 110 Mbps | ? |

TEACH and Badgernet: Limitations on Supply

- Retail cost of Badgernet bandwidth
 - Currently 100 Mbps costs \$27,060 annually
- Total amount of TEACH funds available
 - Current fund is \$26 million annually

How TEACH Funding Works

1. TEACH collects roughly \$26 million annually:
 - a. \$16 million annually from Wisconsin's Public Services Commission (surcharges added to phone bills), and
 - b. \$10 million annually from E-rate reimbursements
2. A school orders Badgernet service through TEACH (100M)
3. TEACH orders service from AT&T (which is Badgernet)
4. AT&T establishes service (in this example, no construction is needed)
5. AT&T bills TEACH (DOA) \$27,060 per year for the service, reducing the TEACH fund by that amount.
6. TEACH bills the school \$3,000 per year for the service, increasing the TEACH fund by that amount.

TEACH, Badgernet, and School Choice

- TEACH provides \$24,060 annually for 100 Mbps service
- By statute, TEACH funds can only be used to subsidize Badgernet service for Internet bandwidth
- Individual districts can choose whether or not to participate in Badgernet
- Individual districts cannot apply their TEACH allocation to another provider

Goals of the next Badgernet Contract

Negotiations between AT&T and the State began in October and are still underway.

- Goal defined by the State CIO: **\$1/Mbps/month**
- This is an ambitious goal. The Education Superhighway's goal for schools nationally is **\$3/Mbps/month**
- If **\$1/Mbps/month** is accomplished, and TEACH funding is not changed, every school in Wisconsin would be able to meet the FCC 2017 benchmark.
- Every student would have 1Mbps continuously available while in school.

Evolution of TEACH

2000 - 2014:

TEACH subsidizes primarily Badgernet service

Beginning 2015:

TEACH adds support for training and infrastructure in rural schools:

- \$1.5 million annually for teacher training in rural schools
- Up to \$7.5 million in the current biennium for infrastructure



There has been no increase in TEACH funding. The funds have been shifted away from broadband subsidies.

Competitive Alternatives

Self-constructed fiber (“Dark fiber”)

- Now funded by E-rate at up to 90%
- Districts can write RFPs for dark vs. lit service
- Almost 95% of all Wisconsin schools already have fiber, so why install more?



Competing against dark fiber projects motivates providers to lower their rates

Competitive Alternatives

- New FCC/E-rate imperative calls for pricing transparency
- Database of all E-rate applications provides comprehensive data about providers, services, and pricing
- Education Superhighway provides free tools to help schools “compare their deals” with each other

Education Superhighway

Compare and Connect K12

- Gathers Internet provider, service, and cost data for all K12 schools
- Provides web-based tools to simplify comparisons between districts
- Goal: to help districts find providers in their area who are offering the best deals

ESH's Compare and Connect K12

All Medium, all locale school districts within 50 miles of Monona Grove School District with Internet Access

| School District | IA \$/Mbps | IA Total Bandwidth (Mbps) | IA Mbps/Student | IA Service Providers | IA Monthly Cost | Schools | Students | IA Cost/Student |
|------------------------------------|------------|---------------------------|-----------------|--|-----------------|---------|----------|-----------------|
| Reedsburg School District | \$5.09 | 1,210 | 0.49 | Charter Fiberlink CCO, LLC, WiscNet & Reedsburg Utility Commission | \$6,163 | 7 | 2,461 | \$2.50 |
| Verona Area School District | - | 2,000 | 0.46 | Mt. Vernon Telephone Company, LLC & Charter Fiberlink CCO, LLC | - | 8 | 4,382 | - |
| Baraboo School District | \$3.10 | 1,000 | 0.35 | WiscNet & Charter Fiberlink CCO, LLC | \$3,103 | 7 | 2,882 | \$1.08 |
| Beaver Dam Unified School District | \$3.19 | 1,000 | 0.3 | AT&T Corp. | \$3,185 | 10 | 3,341 | \$0.95 |
| River Valley School District | - | 300 | 0.25 | Charter Communications & WiscNet | - | 6 | 1,208 | - |
| Sauk Prairie School District | - | 600 | 0.24 | Charter Fiberlink CCO, LLC, WiscNet & Wisconsin Bell, Inc. | - | 6 | 2,503 | - |
| Mukwonago School District | \$4.09 | 1,035 | 0.22 | Time Warner Cable Information Services (Wisconsin), LLC & WiscNet | \$4,233 | 7 | 4,621 | \$0.92 |
| Oconomowoc Area School District | \$8.41 | 1,000 | 0.21 | Windstream Communications, Inc. | \$8,410 | 8 | 4,813 | \$1.75 |
| Portage Community School District | \$5.72 | 500 | 0.21 | Charter Fiberlink CCO, LLC & WiscNet | \$2,860 | 9 | 2,393 | \$1.20 |
| Burlington Area School District | \$6.58 | 600 | 0.19 | Time Warner Cable Wisconsin & WiscNet | \$3,950 | 7 | 3,201 | \$1.23 |

Evolution of E-rate and TEACH

Both the Federal E-rate program and TEACH have evolved in recognition that more than just bandwidth is needed.

FCC's E-rate Modernization

1997 - 2014:

E-rate funds primarily Internet and phone service

Beginning 2015:

E-rate additionally funds “Internal Connections,” meaning, the creation of wireless environments within schools



This is made possible by a doubling of total annual E-rate funding. The 2016 fund is \$5.1 billion.

Components of a wireless environment

Paid for by E-rate under Category 2:

- ✓ Network devices such as routers, switches, and firewalls
- ✓ Cabling
- ✓ Wireless controllers
- ✓ Wireless access points

Not paid for by E-rate:

- Mobile devices (Chromebooks, tablets, laptops)

Challenges for Public Libraries

Wireless usage is increasing tremendously. With more devices coming into the libraries, and more services that are being offered via streaming, libraries need to have the internal equipment capable of meeting this need.

Two areas to look at:

1. Changes to TEACH program in 2015
2. E-rate - specifically Children's Internet Protection Act (CIPA)

Finding Solutions

1. **TEACH** - Change the current language in the 2015 TEACH grants to include libraries. Currently only schools are in the language. This change would allow public libraries to access the same source of funds.
2. **E-rate** - To be eligible for funding for internal equipment in the E-rate program schools & libraries must be CIPA compliant (filtering). Continue to work with libraries on looking at all options to be comfortable and knowledgeable in their decision with filtering.

Challenges for All Schools: Providing mobile devices

- “Anywhere, anytime” access means 1:1
- State or federal funding is not available
- Device costs are dropping, but are still about \$50-\$75/student/year
- Districts must make room in their budgets to cover this annual cost

Challenges for Rural Schools: “Homework gap”

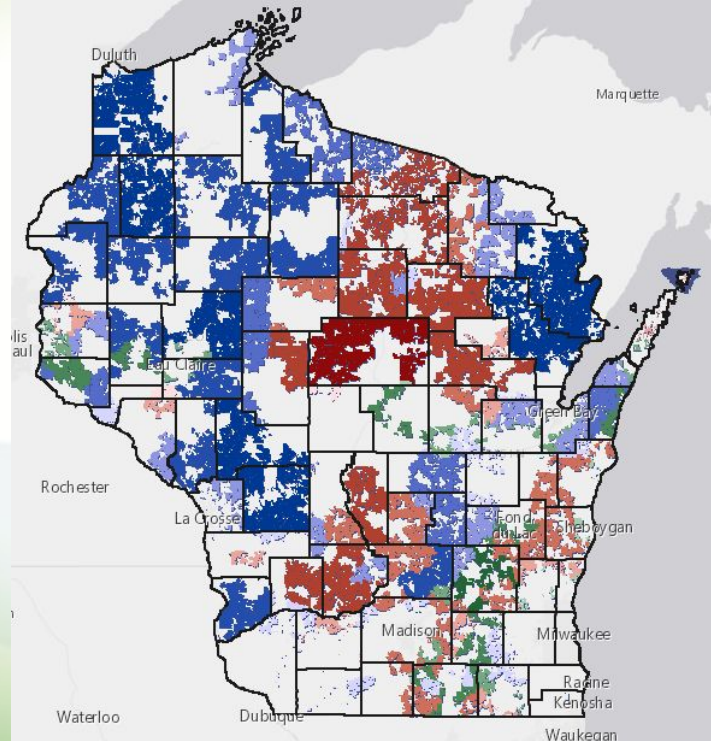
Challenges:

- 584,202 underserved rural Wisconsin households
- Students need Internet access at home for work assigned in school
- “Hotspots” are expensive and require cellular service

Solutions:

- ✓ CAF II: Connect 95% of underserved residences by 2020
- ✓ Lifeline: Low-income households get Internet service for \$10/month

WI CAF II Map



Challenges for Rural Schools: Professional learning (teacher training)

Challenges:

- Mobile environments require new ways of teaching
- Training must be ongoing, and can be expensive and time-consuming

Solutions:

- ✓ Beginning in 2015, TEACH funds \$1.5 million annually to support professional learning (a reallocation of existing funds, not a funding increase)
- ✓ Money is available to all districts with fewer than 13 students/square mile
- ✓ Allocation is \$10/student

Challenges for Rural Schools: Using All E-rate Money

- Total Category 2 funding available to WI schools:
\$130,000,000
- Total requested in 2015: **\$31,000,000**



Less than 25% of available funding was requested

Challenges for Rural Schools: Spending E-rate Money Effectively

- Awareness of eligible expenses
- Available technical expertise to assess and redesign network
- Complexity of Category 2 spending rules

DPI Resources

- [Wisconsin Digital Learning Plan](#)
- [Library Technology](#)
- [DPI E-rate Page](#)