Broadband in New York State

David Salway, Executive Director
NYS Broadband Program Office
NYS Broadband Program Office

- Single Point of Contact for NYS Broadband
- **Regional Broadband Strategies** – Supports Broadband Initiatives for 10 REDC’s
- **Policies** – Recommends Broadband Programs and Legislation
- **Funding** – Administers NYS Broadband Grant Programs
- **Partnerships** – Local, State and Federal Agencies
- **Outreach** – Public, Provider, and Other Stakeholders
What is Broadband?

- High-Speed Internet Access with a Connection that is Always Available

**Wireline**
- Digital Subscriber Line (DSL)
- Cable Modem
- Fiber

**Wireless**
- Satellite
- White Space
- Fixed Wireless
- Mobile Broadband
Working to Close the Digital Divide by Finding a Solution to...

1. Connect Every Community
2. Provide Ultra-Fast Networks for Economic Development
3. Make Broadband Affordable and Provide Digital Literacy Training
1. Million or 5% of New Yorkers Lack Access to Speeds of 6 Mbps Download/1.5 Mbps Upload
New York State Task Force Committees

• Chaired by State Broadband Director
  • Broadband Availability Task Force Committee
    • Examines Challenges/Identifies Solutions to Broadband Deployment

• Broadband Adoption Task Force Committee
  • Examines Disparities/Identifies Solutions in Broadband Adoption
Broadband Partners

Essential to New York’s Success

- Federal Government – FCC / USDA / RUS/ NTIA
  - Partner to Explore Opportunities for Funding
  - E-Rate Collaboration

- State Government
  - Public Services Commission – Streamline Regulations
  - Department of Transportation/Thruway Authority – Dig Once Policies

- Educations/Libraries
  - State Education Department (100 Mbps Speed Threshold)
  - School Districts / BOCES
  - Education Superhighway
  - Schools, Health & Library Broadband Coalition (SHLB)

- NYS Legislature / Local Community Government
  - Explore opportunities in Districts/ Municipalities

- Provider Community
  - Public/Private Partnerships to Expand Networks
$70M
Total Broadband Funding Awarded During Governor Cuomo’s Administration

CNY, REDC Funding will
• Build **6,000** Square Miles of Fiber
• Provide High-Speed Internet Service to:
  • **160,000+** Households,
  • **8,000+** Businesses
  • **400+** Community Anchor Institutions
• Create **1,400** New Jobs
Broadband in NYS Schools
Education Transformation

- Educational Requirements and Standards are Rising
- Schools Cannot Keep Pace without Sufficient Broadband
- Demand growing 30%-50% per year
- Teachers Need High-Speed Broadband to Embrace Digital
Minimum Broadband Speeds

Many Schools Identify Speeds of at Least 100 Mbps as Minimum
Actual Broadband Speeds

More than Half of NYS Schools Report Speeds of <50 Mbps
Actual Broadband Speeds

516 NYS Schools Report no Broadband Service
Broadband in NYS Schools

- No Broadband: 12% (516 Schools)
- Under 25Mbps: 37% (1657 Schools)
- Under 50Mbps: 51% (2248 Schools)
- Under 100Mbps: 54% (2390 Schools)
Public Schools
Reporting Broadband Speeds less than 100 Mbps

- All Public Schools - 4,638
- Public Schools Reporting Speeds less than 100 Mbps -
Public Schools
Reporting Internet Access less than 6/1.5 Mbps

- All Public Schools - 4,638
- Public Schools Reporting Internet Access less than 6/1.5 Mbps -
Why Schools Can’t Connect....

- Lack of Broadband Access - Fiber
  - To the School
  - Inside the School Building
- Affordability of Broadband
- Lack of Technical Resources
Education Extends Outside Of The School Building

• Broadband Access At Home
• Mobile Access On School Buses
• Access To Text Books, Parent Portals, Global Content And Information, And Experts

“In order to effectively integrate technology into the classroom, there needs to be sufficient access to the Internet in both schools and communities.”

-- Governor Andrew M. Cuomo
“A million children's exam results will be on average a grade lower than their peers this year because they do not have Internet access at home.”

--E-learning Foundation, 2011
NYS Broadband Availability
# of Unserved Housing Units

- 3 Mbps / 768 kbps: 418,103
- 6 Mbps / 1.5 Mbps: 498,103
- 10 Mbps / 3 Mbps: 528,103
- 25 Mbps / 10 Mbps: 2,508,103
- 50 Mbps / 10 Mbps: 3,058,103
- 100 Mbps / 10 Mbps: 4,618,103

- NY State Unserved
- Upstate Unserved
Case Study 1: A True Public/Private Partnership for the Greater Good of 3 Counties

• 260 Mile Fiber-optic, Open-Access Backbone Serving Schuyler, Steuben, Chemung Counties

• Driven by: K-12 and Higher Education; Healthcare; Small to Medium Companies; Tourism; Agriculture

• Schools – 47 schools/ 8 Districts
  • Enable Innovative and Creative Instruction (STEM Initiative)
  • 75% Monthly Savings / $481,776 Savings Annually
The New GST Regional STN Network (54X’s More Bandwidth)
Case Study 2: Connecting the North County to High-Speeds

- School District Connected in 2008 (312 Students), but Students Lack Internet at Home
- Slic Network Solutions Partner with Development Authority of the North Country (DANC) to Connect the Community in 2012
- 1,700 People (1,300 Households) have Broadband Access
- School Distributed 78 Laptops to Students 9-12 for E-books, Web Research
- School Went Electronic: School Website; Electronic News, Parent Portal - To Access Grades and Attendance; Online Bus Notes
- Revived The Community and Renewed the Schools as Center of the Community
Broadband in NYS Schools

Where we are

Over 56% of New York Schools Have Insufficient Broadband Capacity

- 31 Schools Report No Broadband Service
- 516 Schools Report Speeds Below Minimum Consumer Broadband Speeds
- 2390 Schools Have Inadequate Broadband Service (<100 Mbps)

Where we should be

NYS Board of Regents – Minimum 100 Mbps per school
ConnectEd – 2014-15: 100 kbps per student; 5 years: 1 Mbps per student
Education Superhighway – 100 Mbps today; 1 Gbps by 2017
SETDA – at least 100 Mbps per 1000 students by 2014-15; at least 1 Gbps per 1000 students by 2017-18
Governor Andrew M. Cuomo’s
Smart Schools Public Symposium
July 21, 2014

www.smartschoolsny.com
Twitter: #SmartSchools
EducationSuperHighway Overview

• Non-profit founded on the mission to upgrade the Internet infrastructure of every K-12 public school in America

• Digital learning is the most scalable path to equal educational opportunity
  – Teachers can personalize learning
  – Students more engaged in content

• Access to sufficient bandwidth is a pre-requisite

• Upgrading schools is a national priority
  – ConnectED
  – E-rate modernization
School Network Connectivity Goals

- **Internet Access**
  - 100 kbps/student (2014)
  - 1 Mbps/student (2018)

- **Wide Area Network (WAN)**
  - 1 Gbps/school (2014)
  - 1 Gbps/school (2018)

- **Local Area Network (LAN)/Wi-Fi**
  - Internal connections capable of supporting 1:1 in every classroom
State of the Nation – K-12 Broadband

Digital Learning Readiness

- Schools Today (100+ kbps/student): 37%
- Students Today (100+ kbps/student): 25%
- Schools / Students 2018 (1+ Mbps/student): 1%

Source: EducationSuperHighway National SchoolSpeedTest
Digital Learning Readiness Based on SETDA Standard
Closing the Gap: Build More Fiber

Only fiber can meet the needs of 98% of schools in five years

Percent of Schools Served

- **Fiber**: 98%
- **Cable**: 82%
- **Legacy Copper / DSL**: 0%
- **Fixed Wireless**
  - 100 Kbps / Student: 2% (2x more expensive than fiber)
  - 1 Mbps / Student: 4%
Closing the Gap: Improve Affordability

Affluent schools are ~3x more likely to meet connectivity goals than low-income schools

**Monthly Cost per Mbps**

<table>
<thead>
<tr>
<th>Internet Access</th>
<th>WAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have 100 Kbps / Student</td>
<td>$5.72</td>
</tr>
<tr>
<td>Don’t Have 100 Kbps / Student</td>
<td>$17.44</td>
</tr>
</tbody>
</table>

**Annual District Budget per Student**

<table>
<thead>
<tr>
<th>Have 100 Kbps / Student</th>
<th>Don’t Have 100 Kbps / Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have 100 Kbps / Student</td>
<td>$7.16</td>
</tr>
<tr>
<td>Don’t Have 100 Kbps / Student</td>
<td>$1.59</td>
</tr>
</tbody>
</table>
Closing the Gap: Improve Affordability

Need to reach prices of $3/Mbps for Internet access and $750/connection for WAN

Estimated Annual Cost per District

- Current Cost: $99,002
- Projected Cost @ Current Goals: $297,360
- Projected Cost @ 2018 Goals: $1,010,160
- Target Pricing: $162,000

Average district: 6 schools, 3,000 students
Scale of Procurement

*Schools are purchasing too little bandwidth to take advantage of economies of scale*

**Internet Access: Monthly cost per Mbps**

- 10 Mbps: $114
- 20 Mbps: $74
- 50 Mbps: $36
- 100 Mbps: $27
- 200 Mbps: $22
- 500 Mbps: $15
- 1 Gbps: $7
- 10 Gbps: $2

Source: EducationSuperHighway *Connecting America’s Students: Opportunities for Action*
Aggregate Demand Across Districts

Regional contracts are often most cost effective

District WAN Cost per Mbps

- National median: $3.03
- <20 connections (1 Gbps): $1.66
- 20-99 connections (1 Gbps): $1.28
- 100+ connections (1 Gbps): $0.44
Create Transparency of Pricing

Cost per Circuit (Vendor A, 1 Gbps WAN, contracted in 2013)

- **Lowest Cost**: $627
- **Median Cost**: $1,275
- **Highest Cost**: $2,651
Increase Competition and Choices

District WAN: Monthly Cost per Connection

- Lit Fiber - Incumbent (1 Gbps): $1,566
- Lit Fiber - Competitive (1 Gbps): $822
- Leased Dark Fiber: $522
- Self-Provisioned Fiber: $187
Case Study: Indian Prairie School District

Procurement Strategy

- Used purchasing scale to lower the cost per Mbps
- Researched prices paid by peer districts
- Spread notice of the RFP to vendors far and wide
- Actively negotiated key terms and conditions instead of simply accepting terms as proposed
  - Mid-contract upgrades
  - Bursting
  - Termination fees

Results

<table>
<thead>
<tr>
<th>Cost per Mbps</th>
<th>Internet Access</th>
<th>District WAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>$20</td>
<td>$5</td>
</tr>
<tr>
<td>After</td>
<td>$5</td>
<td>$5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bandwidth</th>
<th>Internet Access</th>
<th>District WAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>250</td>
<td>259</td>
</tr>
<tr>
<td>After</td>
<td>1,000</td>
<td>1,200</td>
</tr>
</tbody>
</table>

Total cost per month remained constant at ~$30,000
State Broadband Strategies

• State leadership is critical to accelerating upgrades, especially for high-need districts

• Successful state strategies include:
  – Comprehensive assessment of K-12 broadband infrastructure (connectivity, equipment, and costs)
  – Inventory of service provider landscape and fiber availability
  – Network design solutions
  – Strategies to increase affordability
  – Implementation and support plan

• EducationSuperHighway partnering with Virginia and Arkansas to develop state-specific upgrade strategy and plan
Governor Andrew M. Cuomo’s Smart Schools Public Symposium
July 21, 2014

www.smartschoolsny.com
Twitter: #SmartSchools
Schools, Health & Libraries
Broadband Coalition

Presentation to Governor Cuomo’s
Smart Schools Public Symposium
Sept. 17, 2014

John Windhausen, Jr.
Executive Director, SHLB Coalition
SHLB Coalition

- **Mission**: Promote open, affordable, high-capacity broadband for anchor institutions and their communities.
- **Members**: libraries, schools, R&E networks, state broadband mapping organizations, broadband companies, consulting firms, public interest organizations.
- **Funding**: Membership dues, conferences, and the Bill & Melinda Gates Foundation.
- **Status**: Non-profit 501(c)(3) advocacy organization
Broadband Shortage for Anchor Institutions

- **Federal Communications Commission:**
  - Less than 65% of schools and only 15% of libraries have fiber.
  - [http://tinyurl.com/nymgx7l](http://tinyurl.com/nymgx7l)

- **Consortium for School Networking:**
  - Survey in 2013 found that 43 percent of districts said *none* of their schools meet 2014-2015 broadband goals.
  - [http://tinyurl.com/p2zlxny](http://tinyurl.com/p2zlxny)

- **MORENet (Missouri):**
  - 335 of 399 external bandwidth connections in 308 school districts will need additional bandwidth to meet the 2014-2015 bandwidth goals.
  - [http://tinyurl.com/omntcjp](http://tinyurl.com/omntcjp)

- **CENIC (California):**
  - 71% of California libraries have Internet speeds below 20 Mbps, and 84% have Internet speeds that it finds are "slow" ("stunning.").
  - [http://tinyurl.com/pjd46sr](http://tinyurl.com/pjd46sr)
Consequences of the Broadband Shortage

- Teachers continue one-way lecturing instead of interactive learning.
- Students lack technological skills for the 21st Century workforce.
- Students unprepared for college.
- Learning stops at the end of the school day.
- Technology used for entertainment, not education.
- Libraries become overcrowded but with fewer resources.
Solution: Invest in High-Capacity, Shared Networks.

Investing in open, interconnected, shared (fiber optic) networks can yield lower costs for all.

- Scalable and “future-proof”; can be upgraded simply by changing electronics.
- Last for decades.
- Sell excess fiber strands to commercial users for economic growth.
- Security can be protected.
- Can often result in lower operational/maintenance costs.
  - (Initial capex = opex)
Broadband Program Example #1:

Broadband Technology Opportunities Program (BTOP) (NTIA)

- Provided one-time investment of $3 B in 2010-2013.
- 115 “Middle Mile” broadband deployment grants.
- Over 20,000 anchor institutions connected nationwide (about 10%).
- Over 800 interconnection agreements with commercial partners.
- Fostering further private sector deployment to homes, businesses.
Broadband Program Example #2

E-rate Program
(FCC)

- Provides $2.4 B annually to schools and libraries
- Primarily supports recurring expenses
- FCC now considering expanding program to cover deployment (capex) specifically.
- July 2014 Order allows E-rate networks to be shared with health providers, government entities, other public institutions.
Broadband Program Example #3

**Healthcare Connect Fund (FCC)**

- Authorizes $400 M annually in support of both recurring (opex) and investment (capex) expenses;
- Applicants must provide 35% match;
- Underutilized, only $100M so far;
- Consortia can include 51% rural and 49% urban;
- Networks can be shared with schools/libraries.
Examples of State Broadband Programs

- **Nebraska**: Nebraska Broadband Pilot Program
- **Iowa**: Connect Every Iowan
- **California**: California Advanced Services Fund and California Emerging Technologies Fund
- **Georgia**: Broadband Rural Initiative to Develop Georgia’s Economy (BRIDGE)
- **Pennsylvania**: E-Fund
- **Illinois**: Gigabit Communities Challenge
Thank you.

John Windhausen Jr.
Executive Director, SHLB Coalition
jwindhausen@shlb.org  (202) 256-9616
www.shlb.org
Governor Andrew M. Cuomo’s Smart Schools Public Symposium July 21, 2014

www.smartschoolsny.com
Twitter: #SmartSchools
Marcus Whitman CSD

Rural Central School District
Finger Lakes Region
Beautiful rolling hills, farms
Not a dense market for service providers
District Demographics

- Student enrollment 1440 (2008)
- 154 square miles
- 2 counties
- 3 campuses
  - Middle/High School campus
  - Gorham Elementary campus
  - Middlesex Valley Elementary campus
Where do we want to be? An Instructional Review (2008)

• Year long process led by Administration, Community and Instructional committees
  – Engaged learners
  – Technology integrated instruction
  – Interactive white boards
  – Virtual field trips
  – Streaming video
  – Web 2.0 tools
2008: We need Infrastructure for Today & Tomorrow’s Learning

• Internal network – ok

• Internet connection – ok at High School Bldg
  – BOCES Edutech RIC provides Internet Connectivity
  – Negotiate with providers on behalf of 47 school districts
  – Pricing remains flat or goes down and speeds increase
  – Better than anyone had at home at the time
2008: We need Infrastructure for Today & Tomorrow’s Learning

- Internet and intra-district connectivity to elementary buildings = problem.
  T1 lines connect elementary schools to HS
  Email is slow .... Next day
  Can’t stream video..... Buffering
No fast access to Student Information System

Common resources duplicated at each building
Software licensing costs = x3 buildings
Our Beliefs and Challenges

- All of our schools need high speed connectivity and Internet
- We need fiber connectivity between buildings
- Fiber connectivity is Capital Project work
- Fiber connectivity is a necessary utility
  - No different than electric, water or sewer connections
- Should be paid for/aided as a connection fee
- At the time (2008) fiber connections were outside the scope of approved/aidable projects in our Capital Project
Getting Connected

Edutech RIC

Axcess Ontario

Public Bid for dark fiber to connect our 3 campuses. Only 2 bids were received
The Change (2009- present)

- Access to Student Information System (online)
- Virtual Field Trips
- Skype with authors, scientists, global connections for Language classes
- Streaming video from Discovery Education and WXXI
- Using iPads and Google Apps in the classroom
- Online “Virtual Advanced Placement” classes
An “Aha” Moment: The Plant Life Cycle

This is how we used to explain the plant cycle to 3rd graders:

It would take 2 or 3 lessons for students to comprehend.

Now they watch a 10 minute video and they’ve got it!
Other Benefits

• Telephone service provider
  – Open fiber access allowed for new providers to service us
  – Solicited RFP’s (*eRate guidelines)
  – Changed vendors
  – $6,000 annual savings

• Access to online services
  – Cloud data backup
  – Redundant Internet Service Providers

• Keep phone and data networks on separate networks

• Ability to give dedicated fiber access to BOCES sites and other programs housed in District
Steps to take?

- Start with a plan
- Needs assessment – include instructional and technical people
- Check with your RIC
- Reach out to local municipalities – they may have something in the works
- Keep eRate procedures and timelines in mind
Questions?
Governor Andrew M. Cuomo’s Smart Schools Public Symposium
July 21, 2014
www.smartschoolsny.com
Twitter: #SmartSchools
Governor Andrew M. Cuomo’s
Smart Schools Public Symposium

Smart Schools – Higher Education Partnerships & Workforce Development

Peter Turner
Clarkson University Dean of Arts & Sciences
pturner@Clarkson.edu
Introduction

A little about me
Clarkson’s Educational Outreach Partnerships
Workforce Issues & some National Perspective
College & STEM Readiness
How does this connect to Smart Schools?
Some of our activities: Broadband contribution

Roller Coaster Project (grades 7-12)
• Includes tutoring, competitions, math and science content
• Professional Development, too
• Some distance components, need to be enhanced
Other PD and student based outreach, too
• Distance is an obstacle

HS Students in CU freshmen classes – only local at present
Workforce Issues

- PCAST *Engage to Excel*
  - One million more STEM graduates needed
  - Highlighted “Math Gap”
- INGenI OuS
- Curricular concerns
- Relevance provides motivation
  - But many teachers are not prepared
  - PD is needed
Why this focus on Math?

STEM doesn’t happen

Biggest obstacle to success in transition to college STEM programs
How can we address this?
College & STEM Readiness

- Math readiness is critical
- Rural schools, inner city share problems
  - Economic situation the biggest single discriminator
- Lack of resources
  - Budgets severely stretched
- Lack of opportunities for enrichment, extension
  - Hurts both ends of spectrum
How do we get there?

• To fill the workforce needs, *every child* needs the chance to succeed
• Broadband is vital
  • In schools and at home
  • Libraries also critical in poorer communities
• Needs partnerships of formal and informal education
  • Plug the gaps
  • Level the playing field
    • The least advantaged are struggling uphill
How can we (Higher Ed) help?

- Higher education can play a major role as a partner
  - STEP programs, MSP etc
- Especially in less wealthy areas, distance delivery is an essential component
- Transition support for students entering college
  - Clarkson’s readiness surveys and
  - *CU-Math* online refresher – the 30-70 story
  - High speed internet critical
What’s the role of Smart Schools/Broadband?

• In short, we cannot get there without it
  • Workforce goals equate to economic stability
  • Cannot reach PCAST goal without engaging every sector of society
  • Cannot engage every sector without appropriate P-12 opportunities (and training)
  • Cannot provide those opportunities without good connectivity
Governor Andrew M. Cuomo’s Smart Schools Public Symposium
July 21, 2014

www.smartschoolsny.com
Twitter: #SmartSchools