



**Governor Andrew M. Cuomo's
Smart Schools Public Symposium
July 21, 2014**

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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

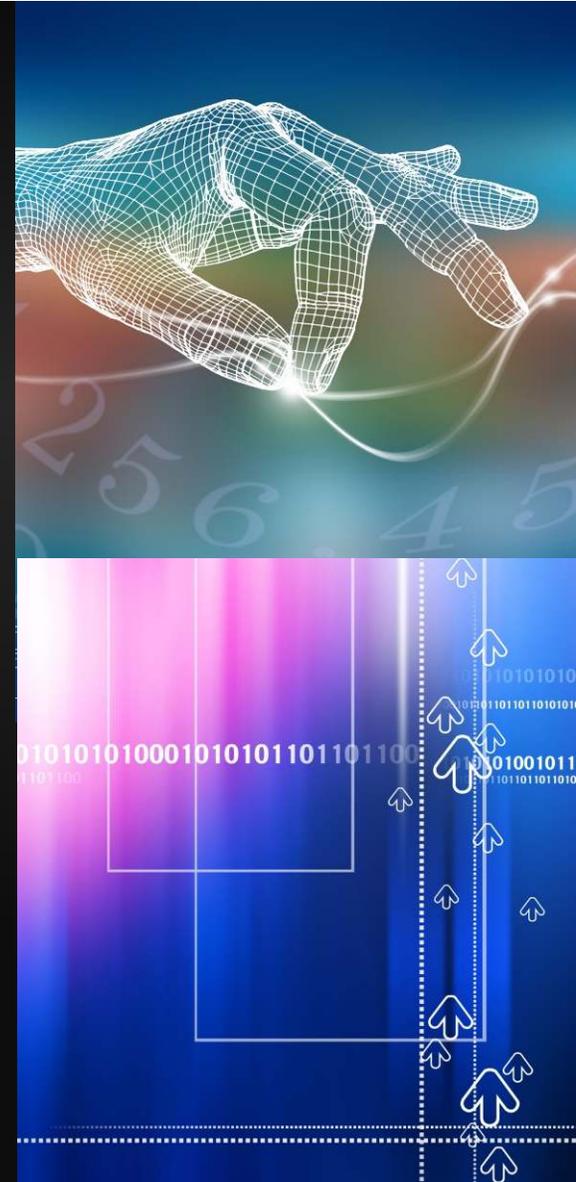
- White Space

- Fixed Wireless

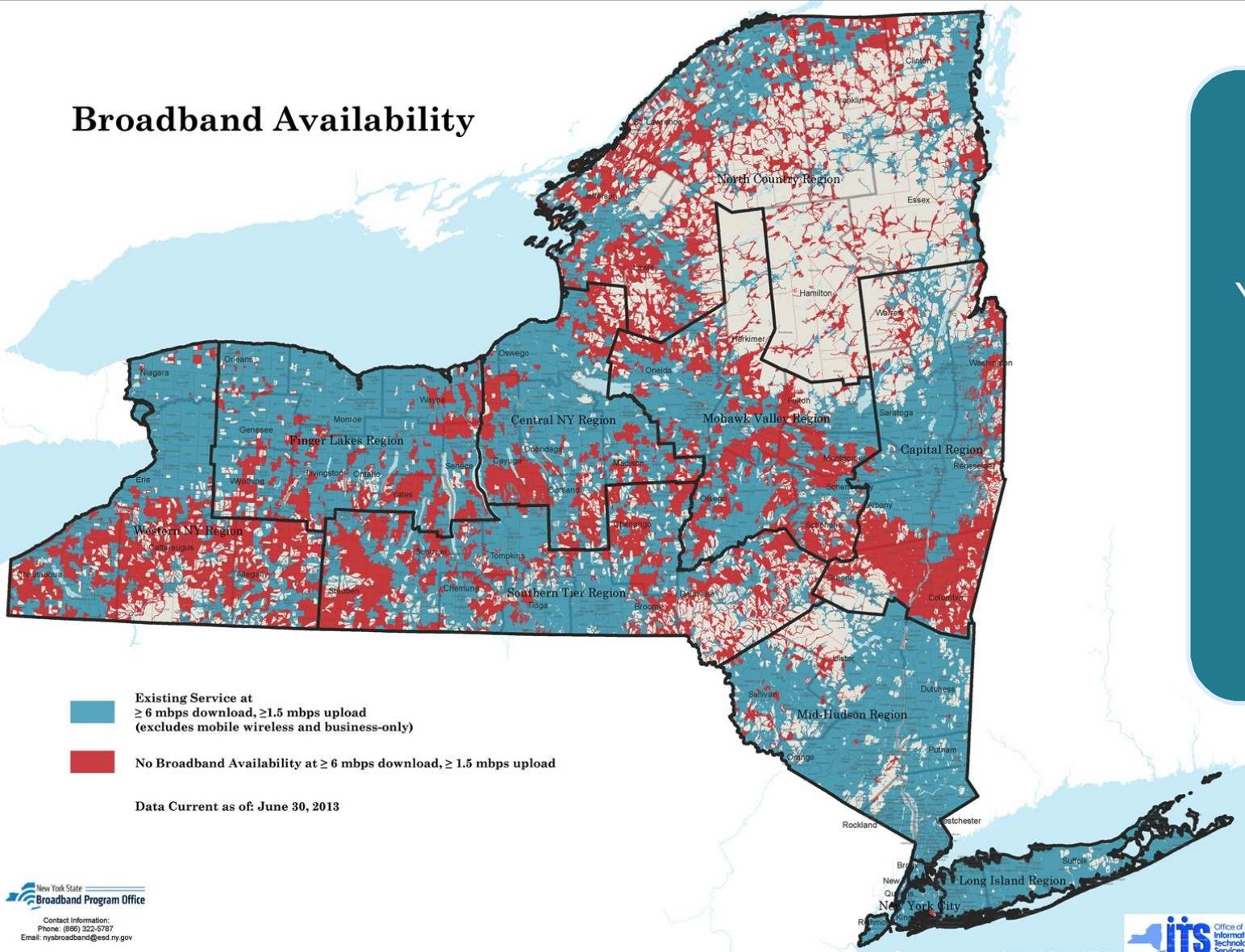
- Mobile Broadband

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



Broadband Availability



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



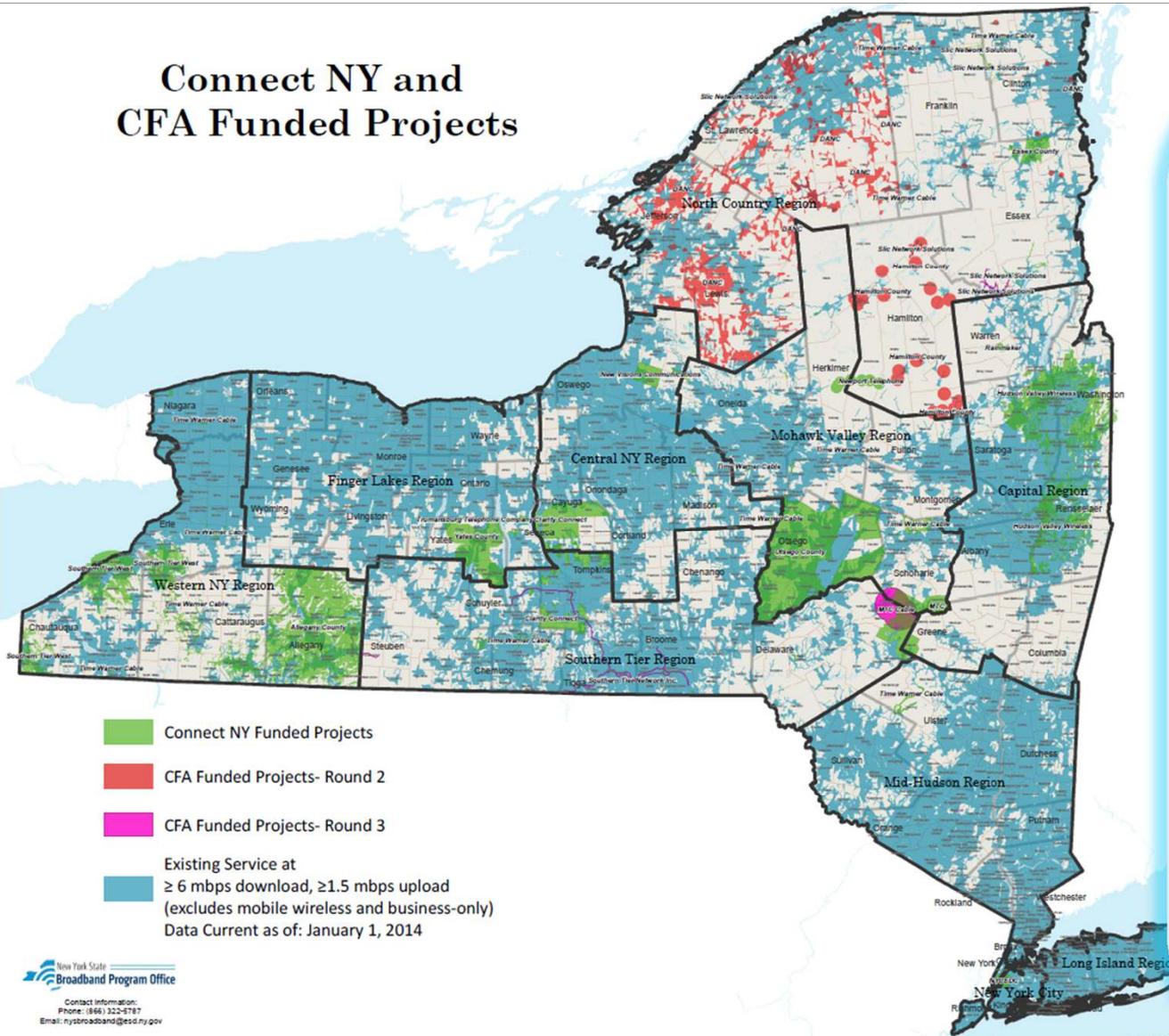
Broadband Partners

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



Connect NY and CFA Funded Projects



\$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



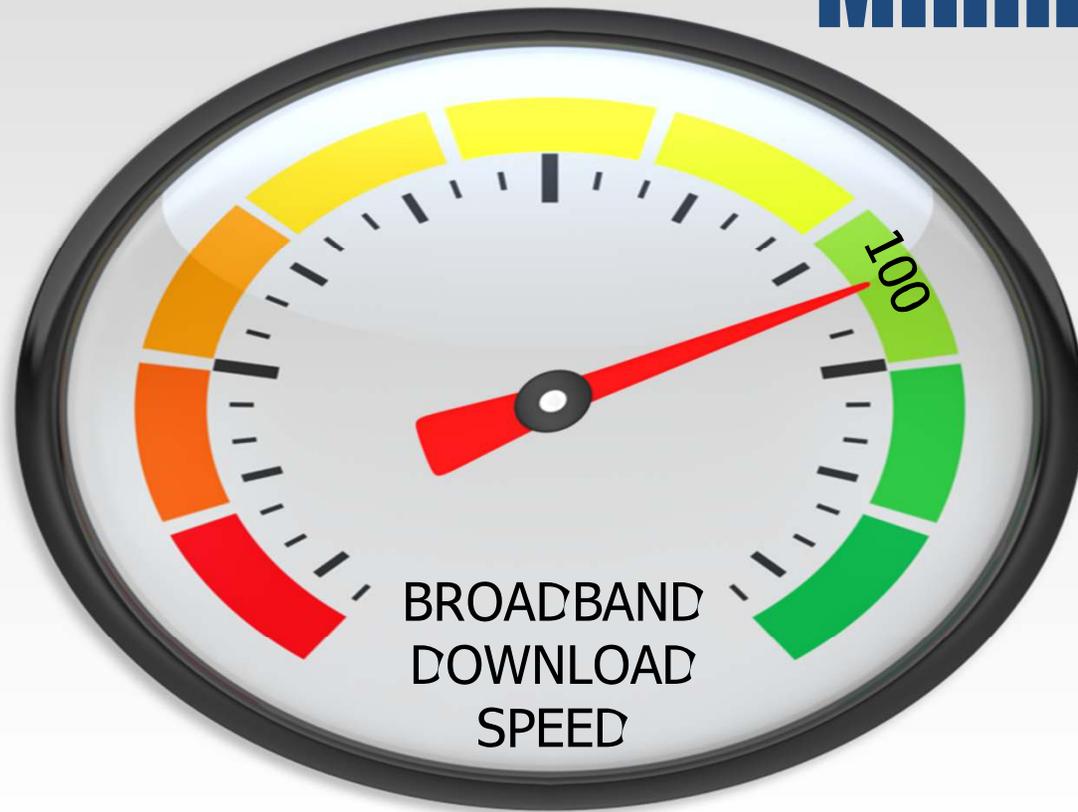
Education Transformation



- 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



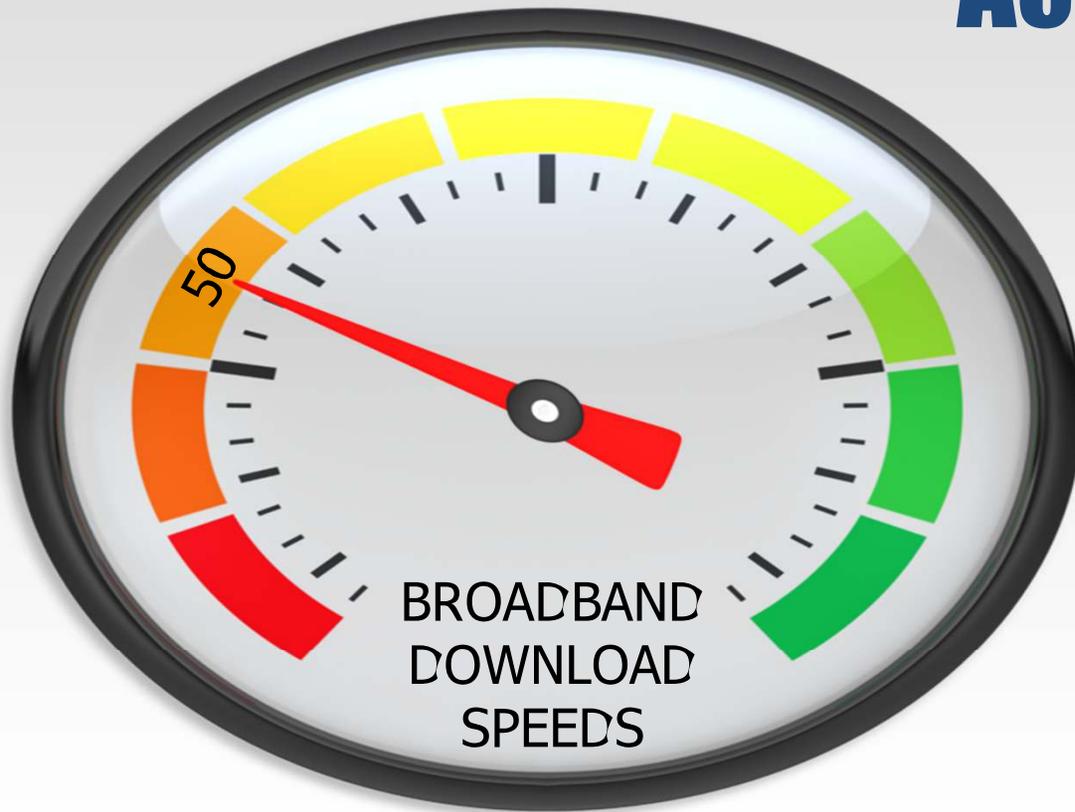
Minimum Broadband Speeds



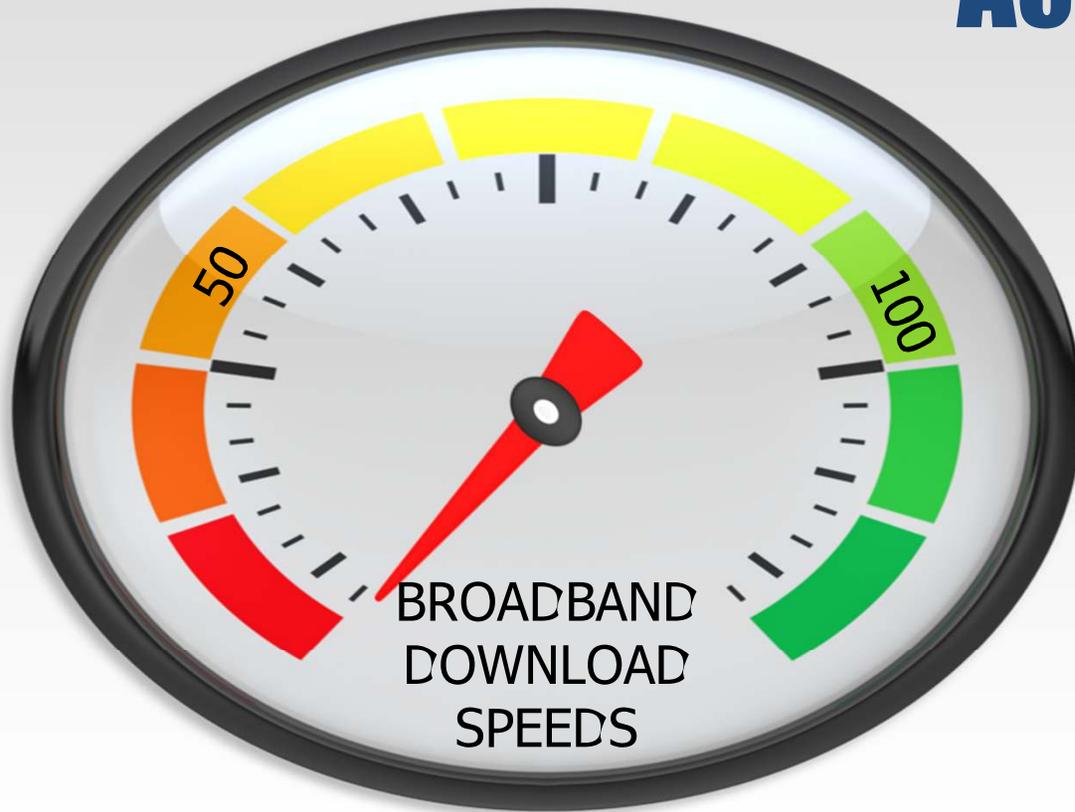
Many Schools Identify Speeds of at Least 100 Mbps as Minimum

Actual Broadband Speeds

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



Actual Broadband Speeds



516 NYS
Schools
Report no
Broadband
Service

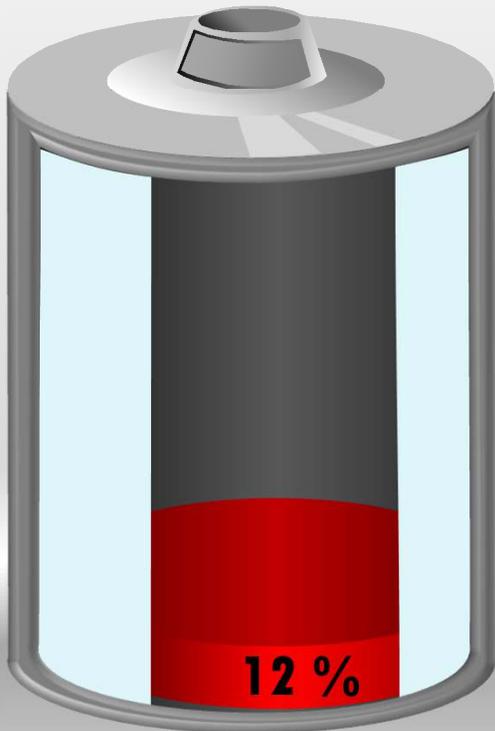
Broadband in NYS Schools

No Broadband

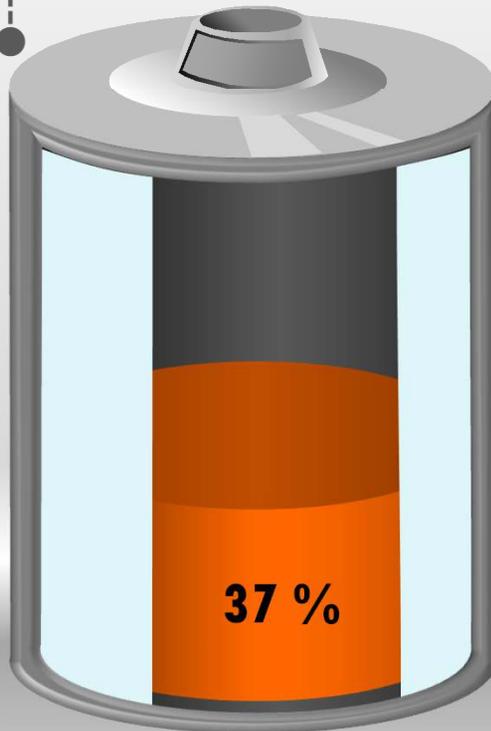
Under 25Mbps

Under 50Mbps

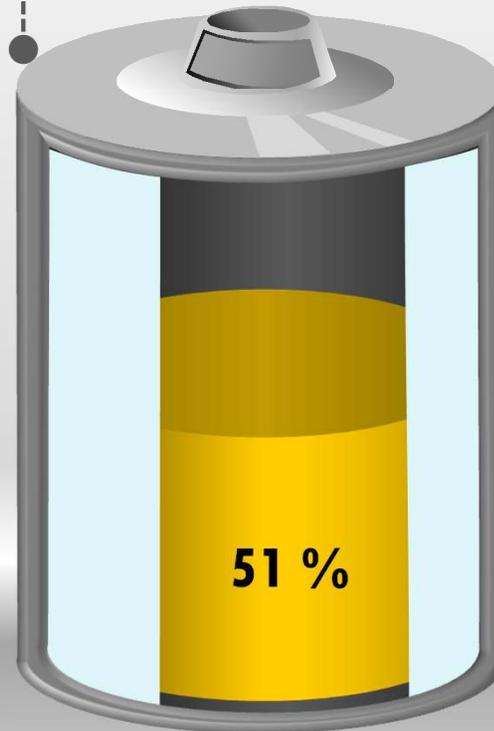
Under 100Mbps



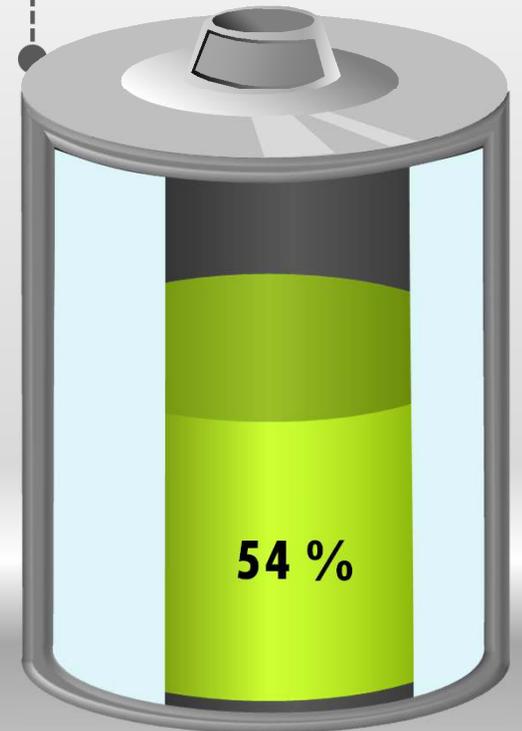
516 Schools



1657 Schools

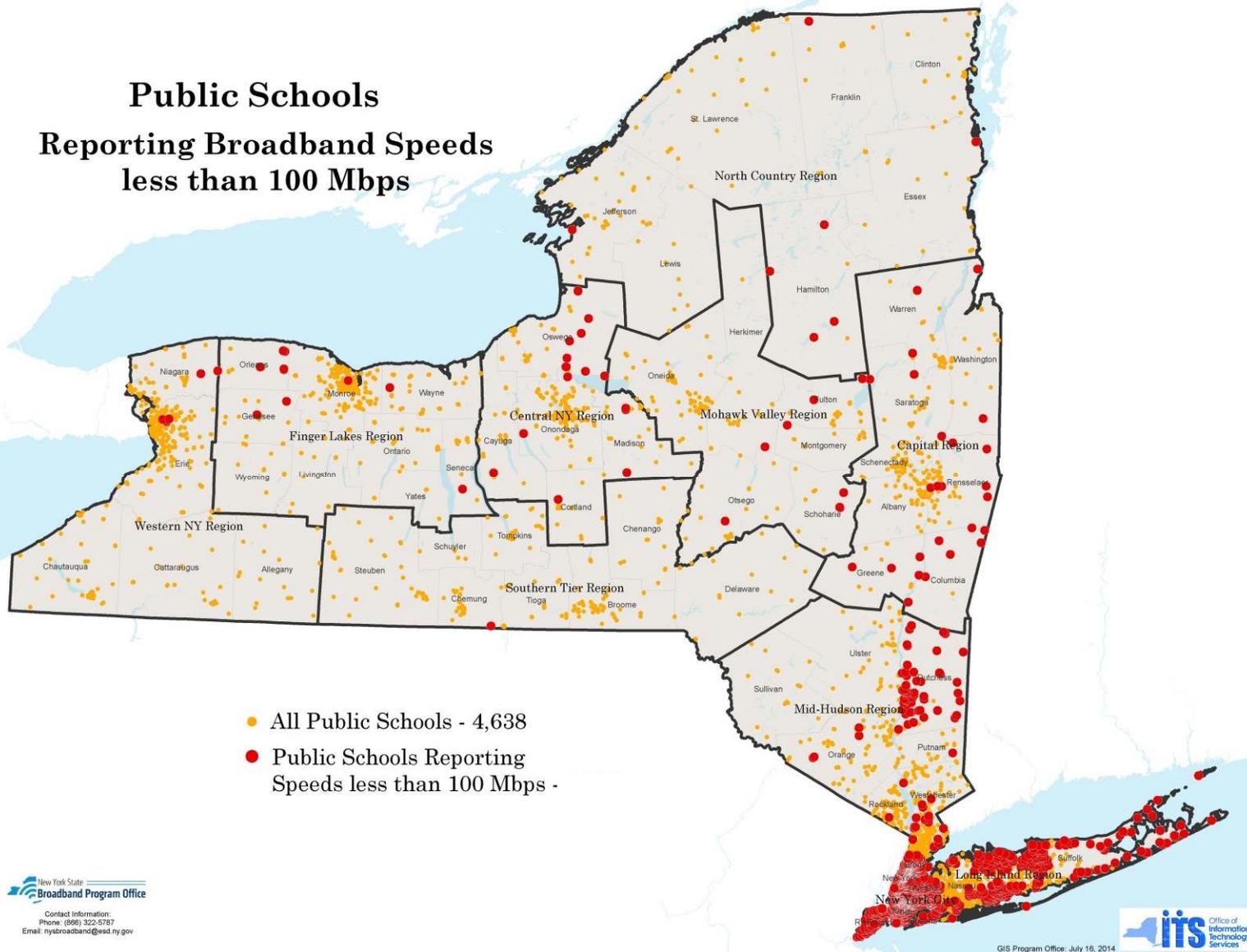


2248 Schools

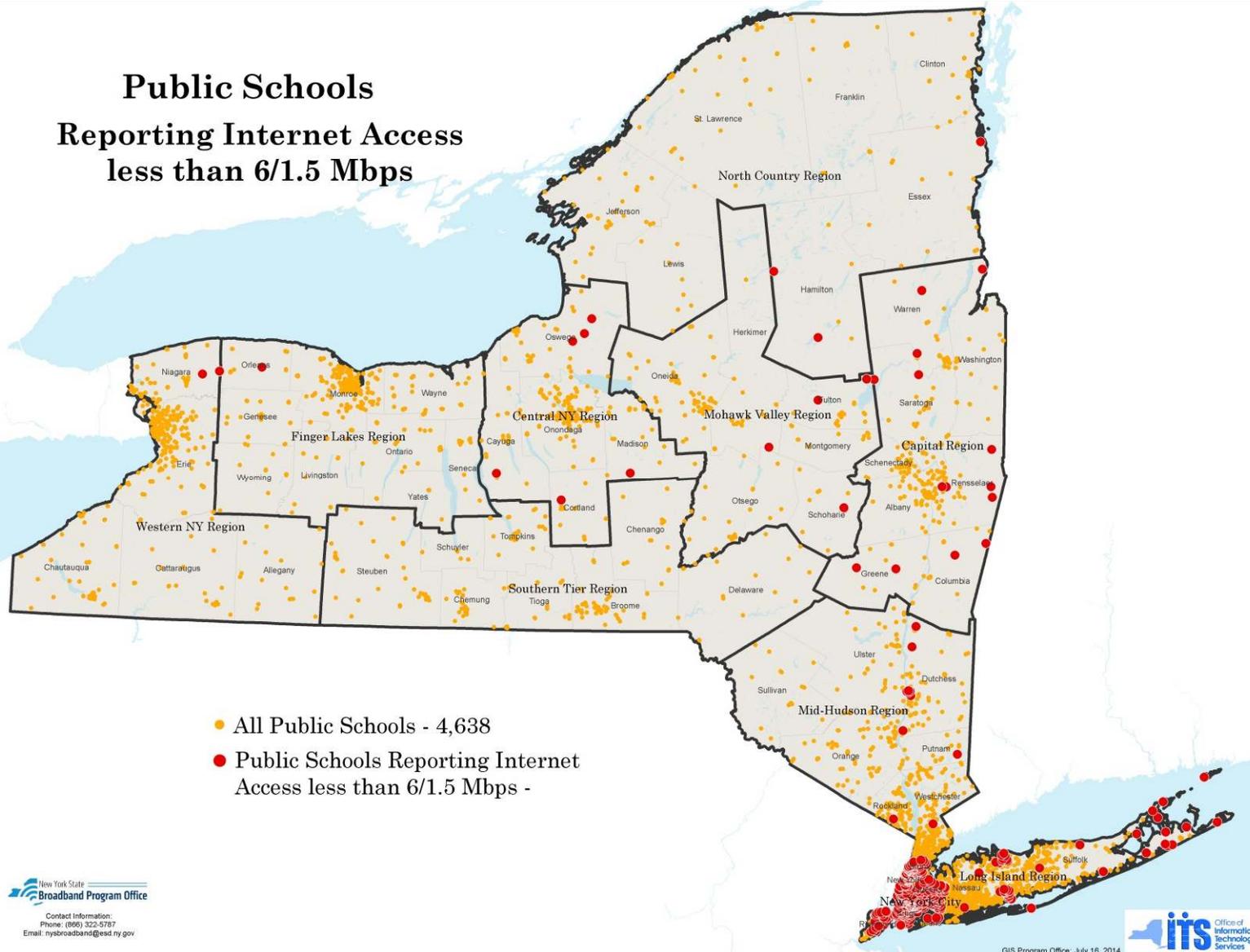


2390 Schools

Public Schools Reporting Broadband Speeds less than 100 Mbps



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



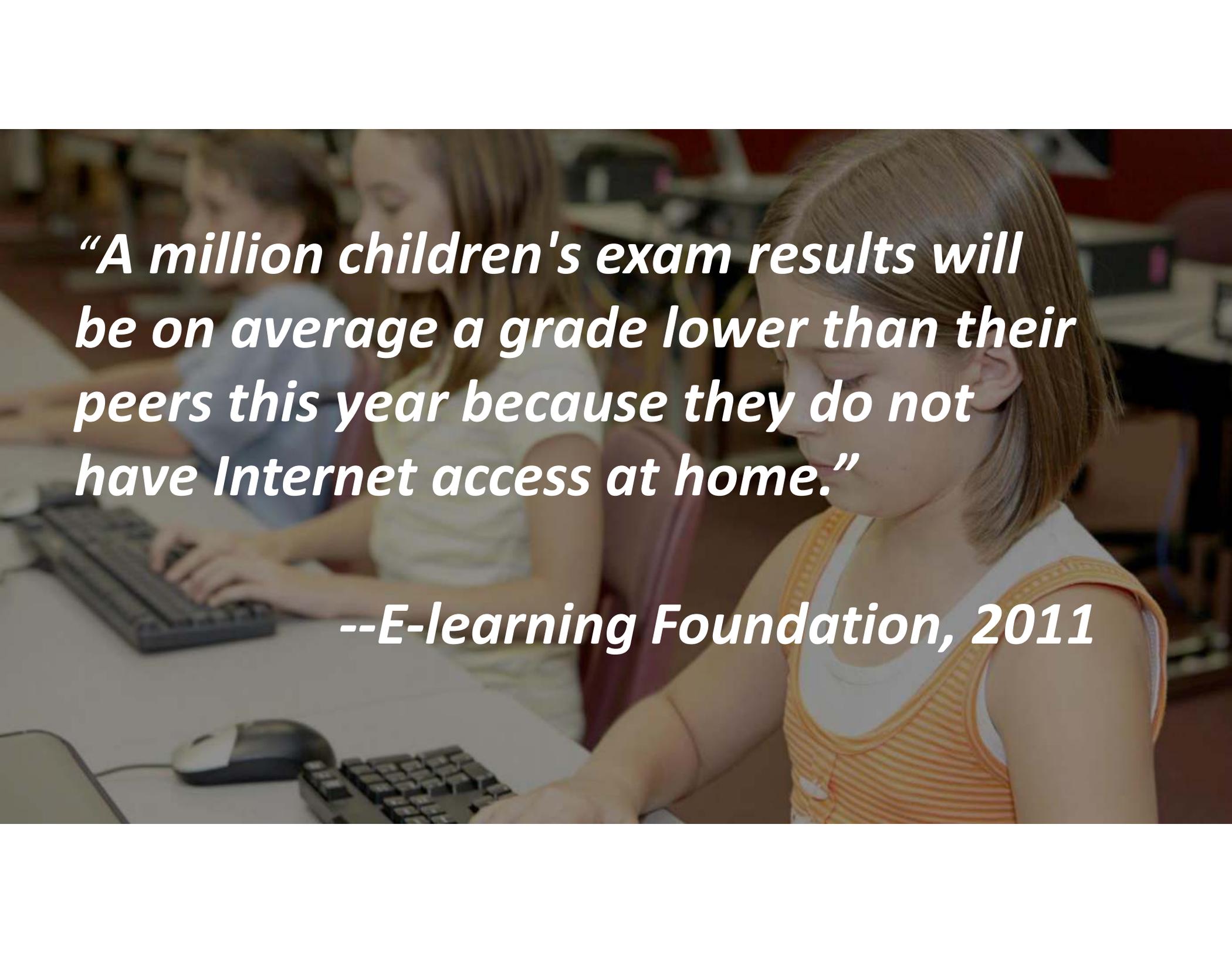


Education Extends Outside Of The School Building

- 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.”

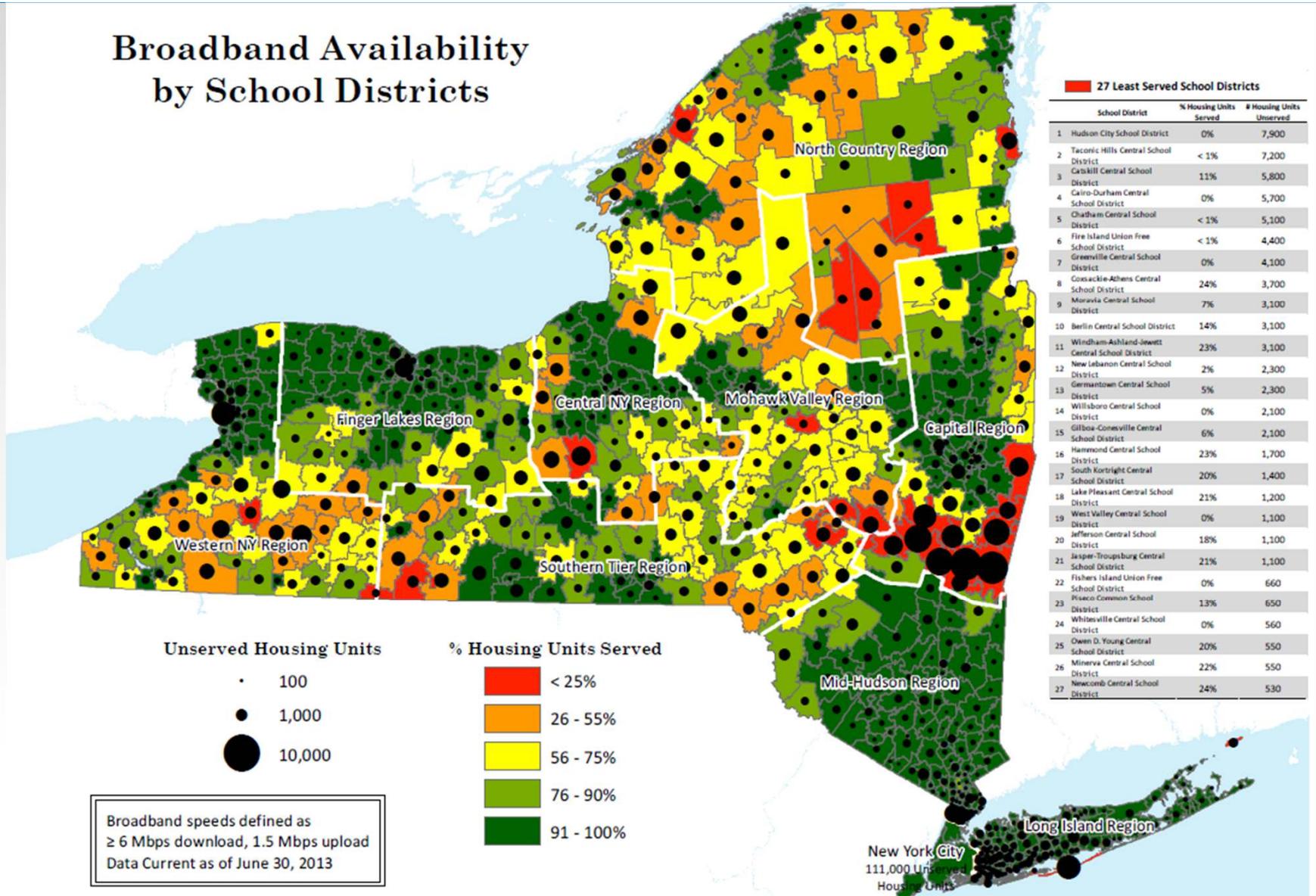
-- Governor Andrew M. Cuomo



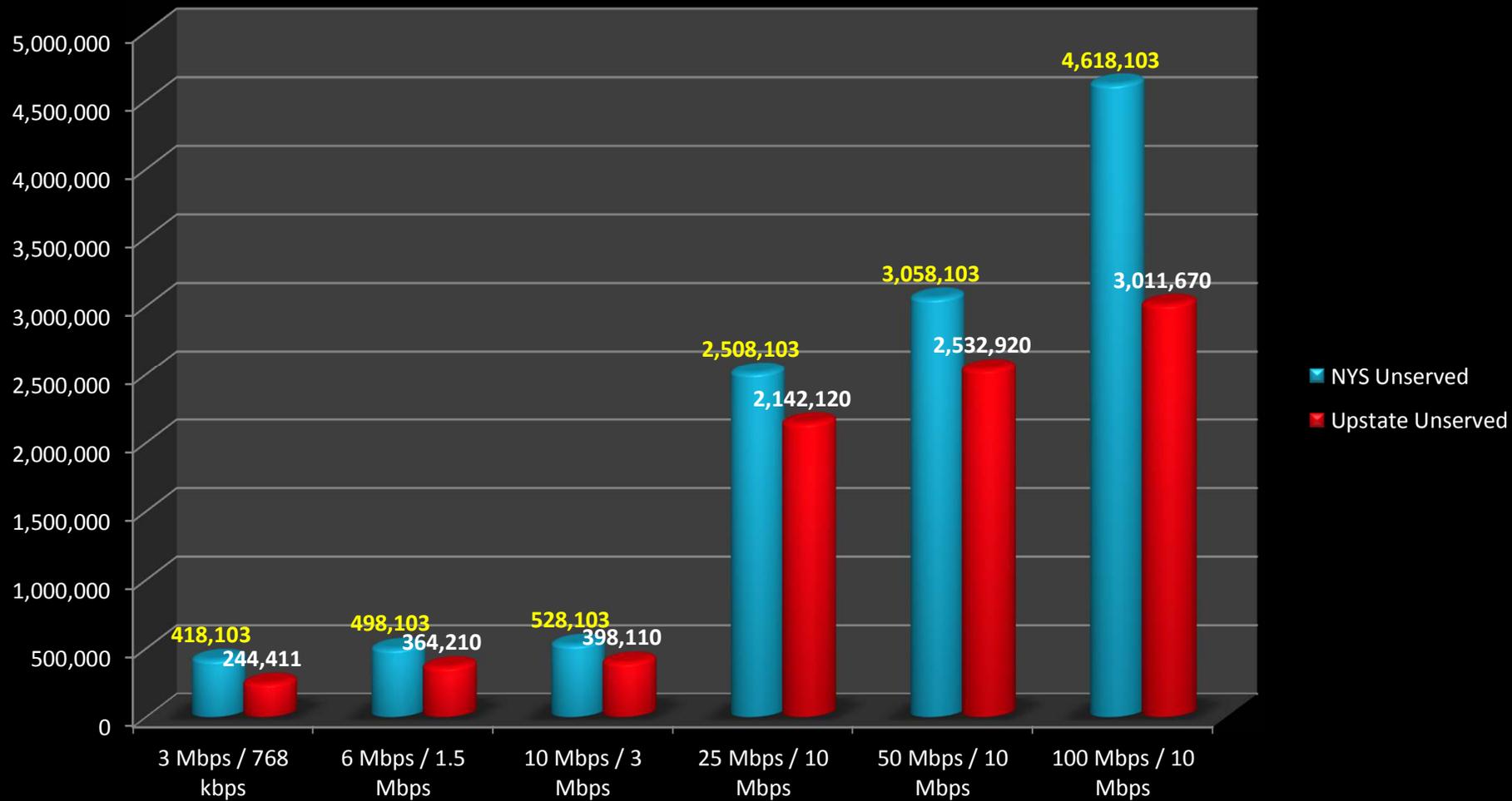
“A million children's exam results will be on average a grade lower than their peers this year because they do not have Internet access at home.”

--E-learning Foundation, 2011

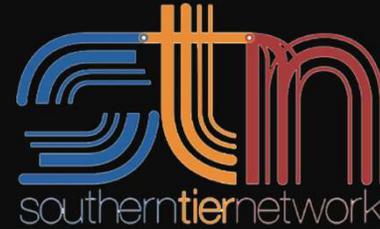
Broadband Availability by School Districts



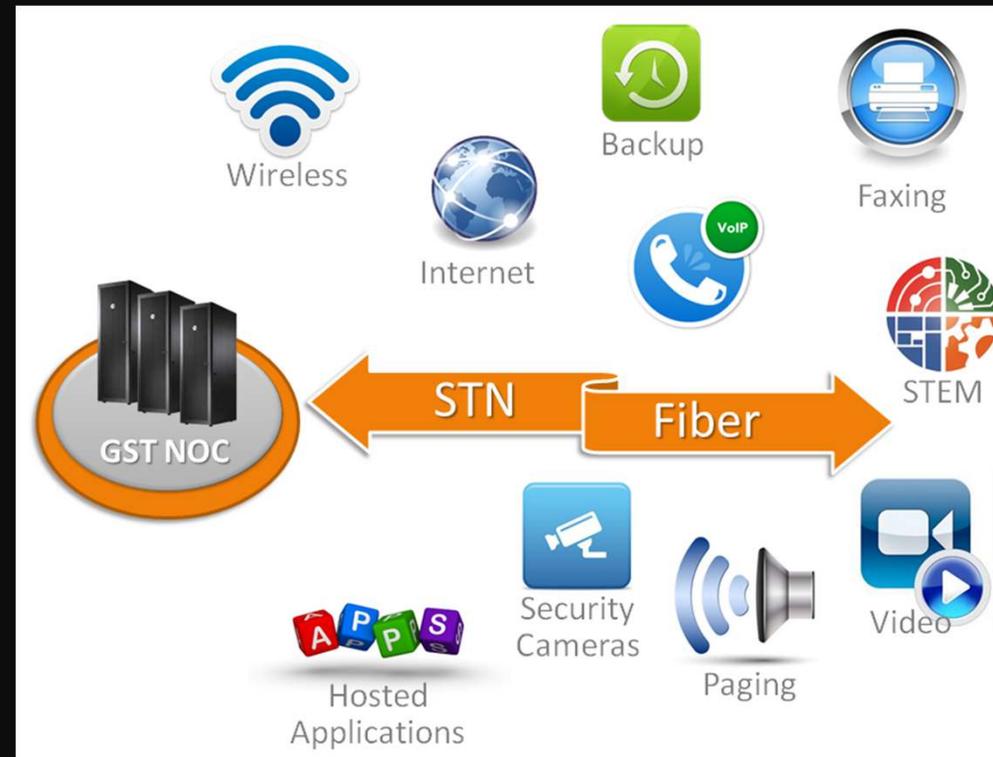
NYS Broadband Availability # of Unserved Housing Units

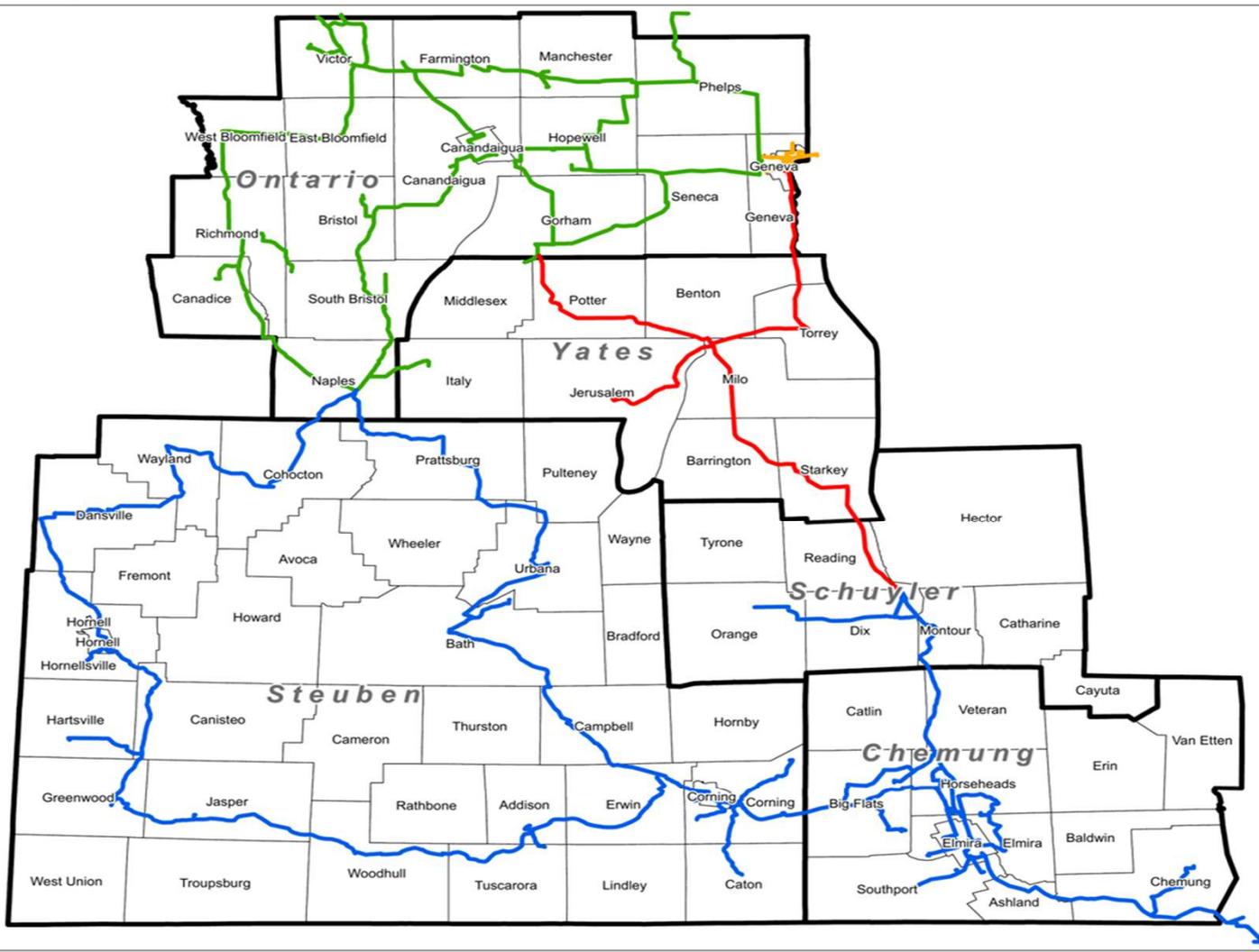


Case Study 1: A True Public/Private Partnership for the Greater Good of 3 Counties



- 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

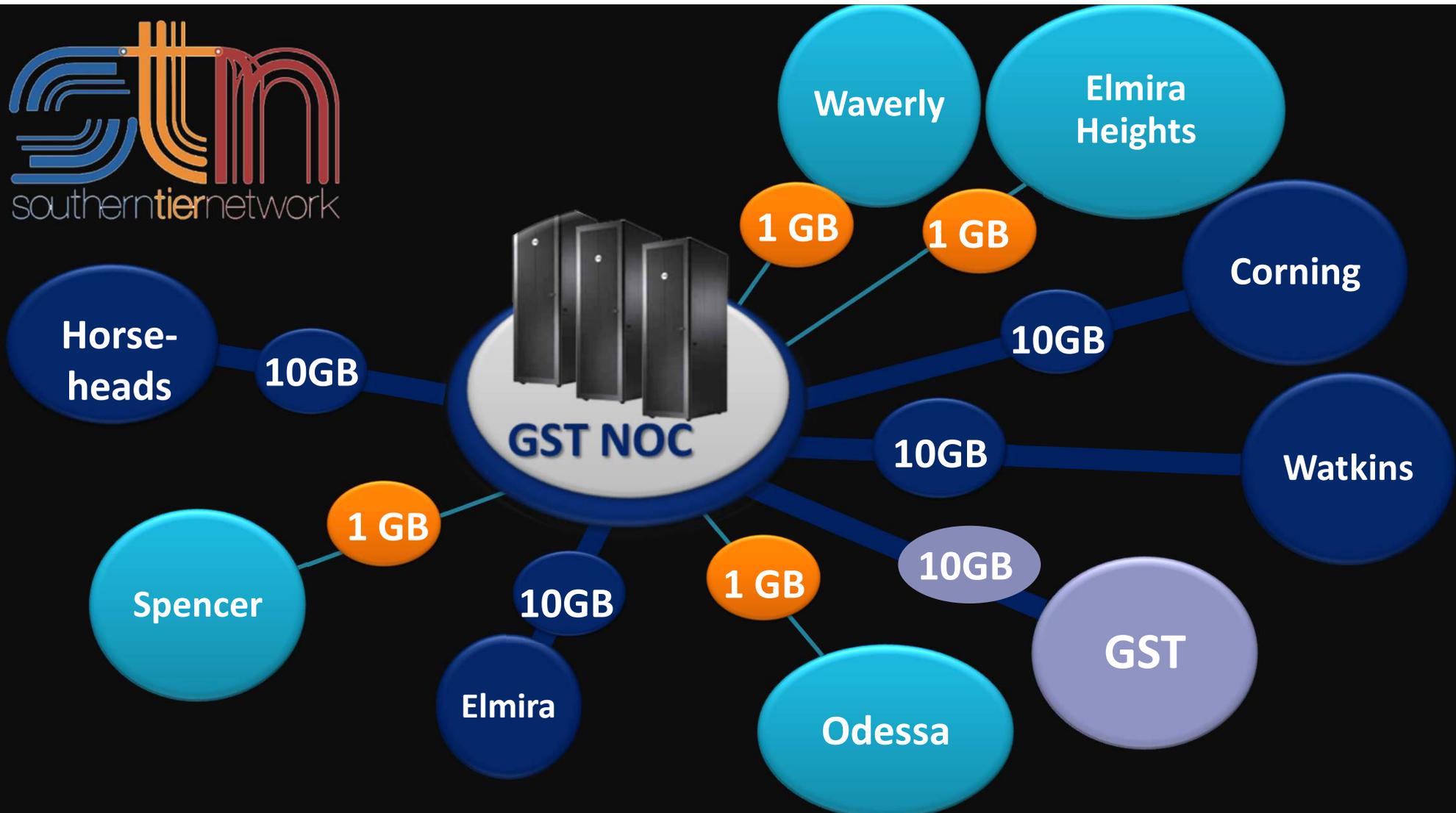
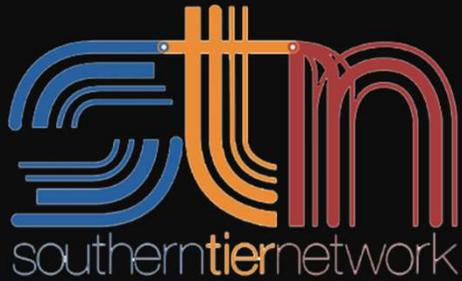




Ontario/Yates/Steuben/Schuyler/Chemung/Tioga/Broome
Regional Fiber Map
Date: 3/6/2013

Confidential Information: Do not distribute.





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 – 100Mbps 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

The logo features a stylized white outline of the state of New York on the left, with three curved lines extending from its right side to represent a signal or broadband waves.

New York State 
Broadband Program Office

www.nysbroadband.ny.gov

nysbroadband@esd.ny.gov

877-322-5787



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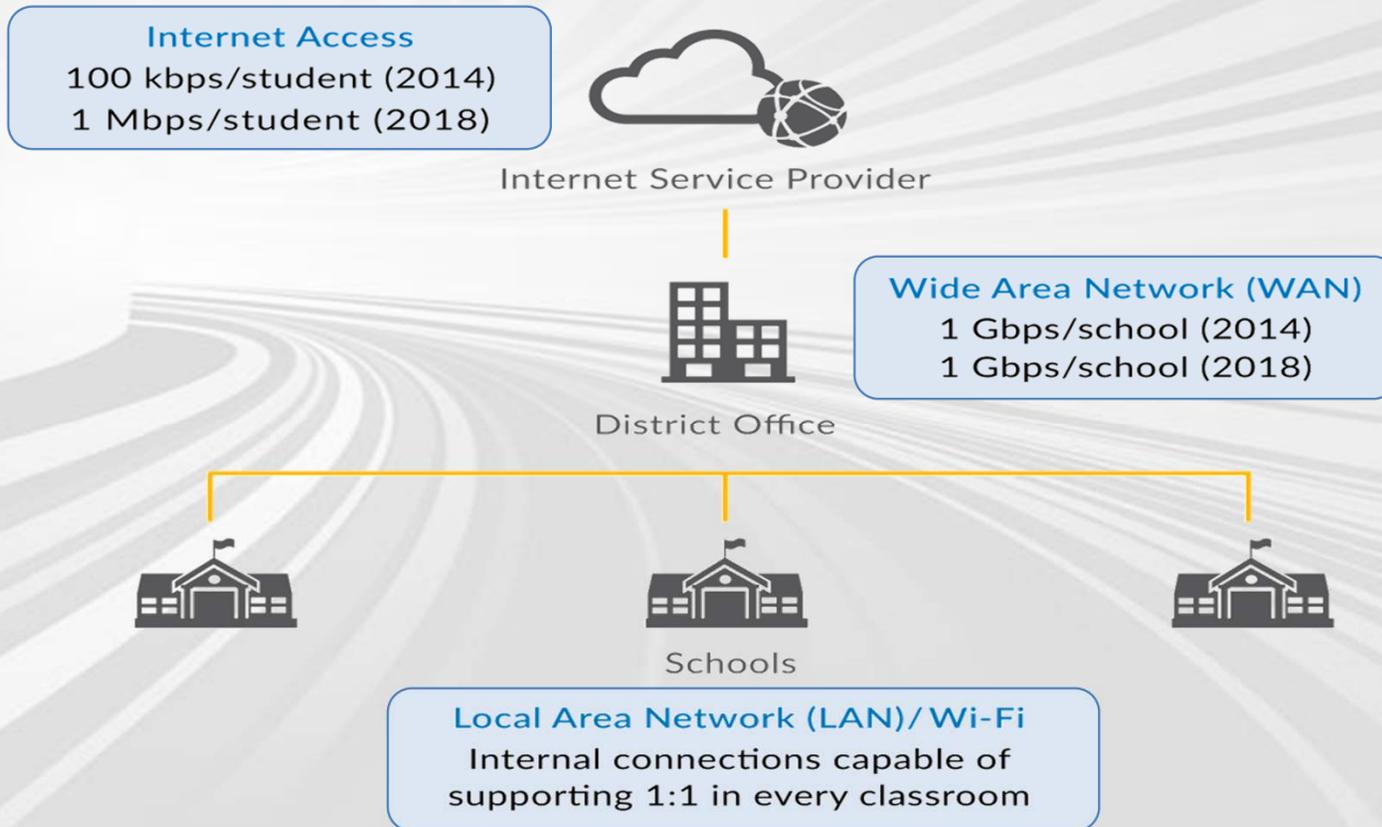
Smart Schools Symposium

September 17, 2014

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

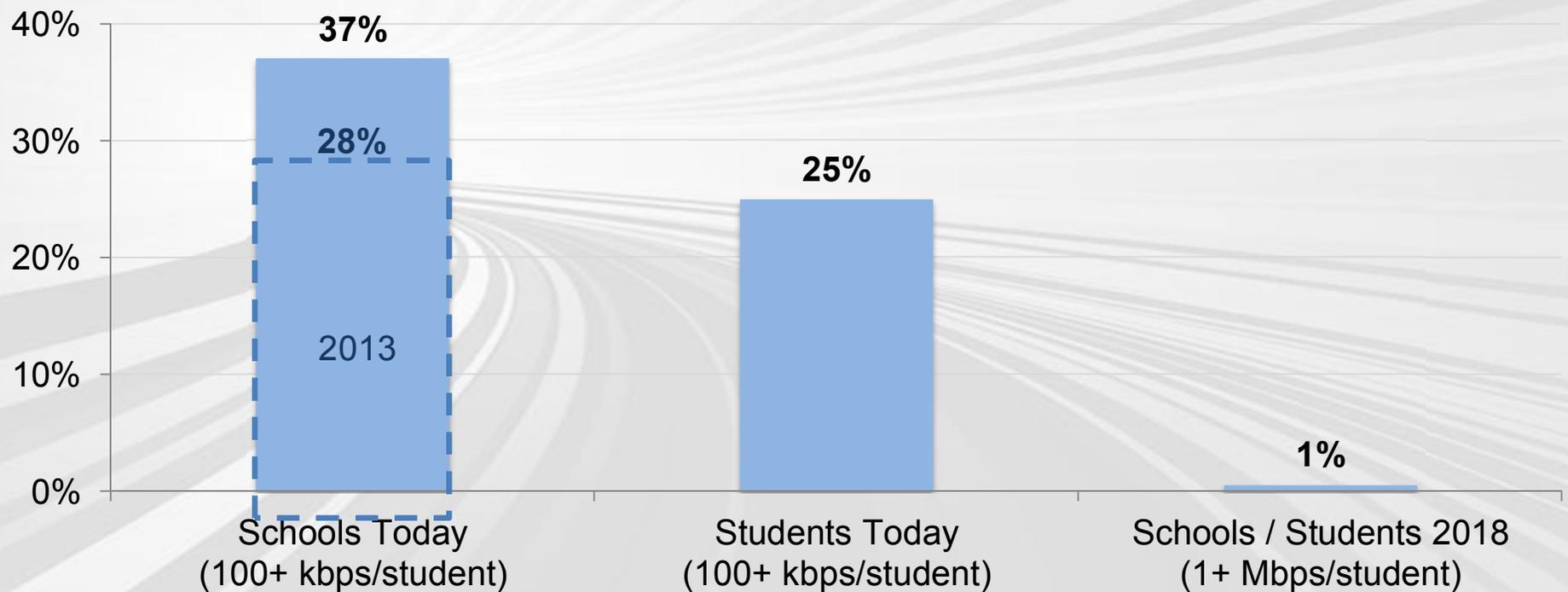
School Network Connectivity Goals



State of the Nation – K-12 Broadband



Digital Learning Readiness

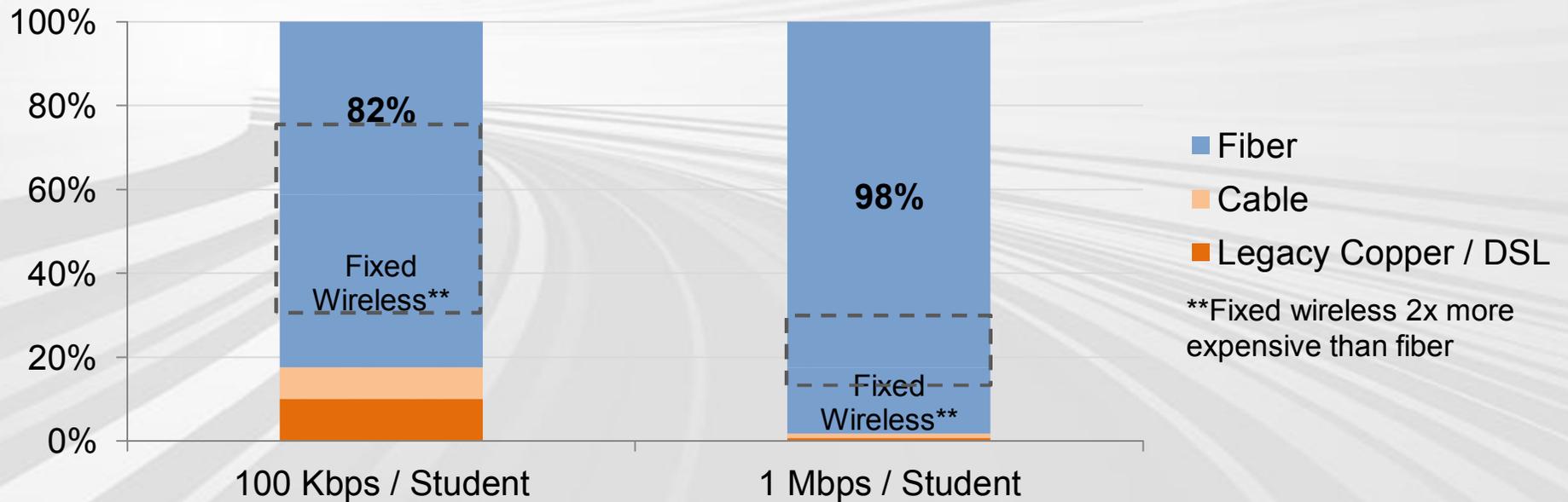


Source: EducationSuperHighway National SchoolSpeedTest
Digital Learning Readiness Based on SETDA Standard

Closing the Gap: Build More Fiber

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

Percent of Schools Served



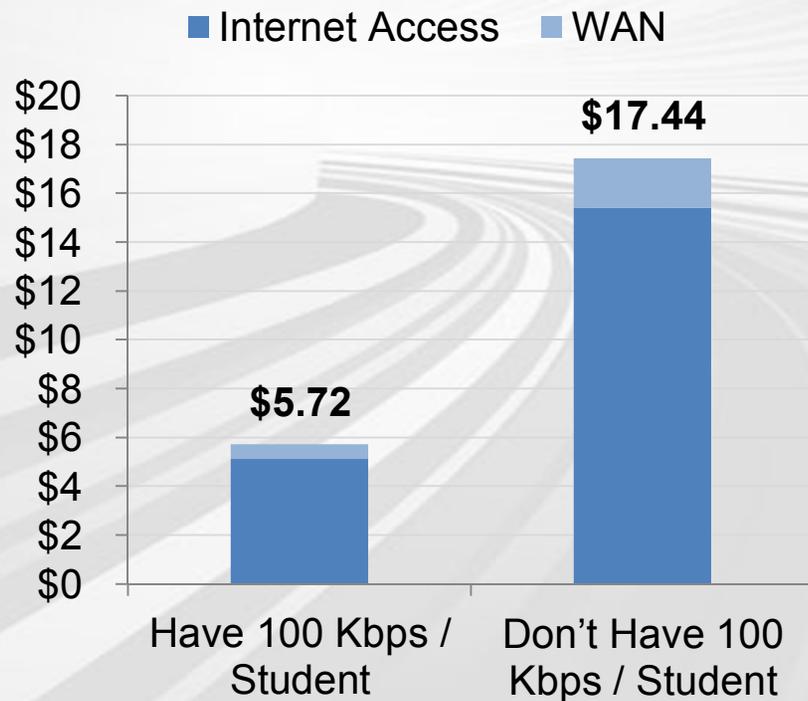
**Fixed wireless 2x more expensive than fiber

Closing the Gap: Improve Affordability



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

Monthly Cost per Mbps



Annual District Budget per Student

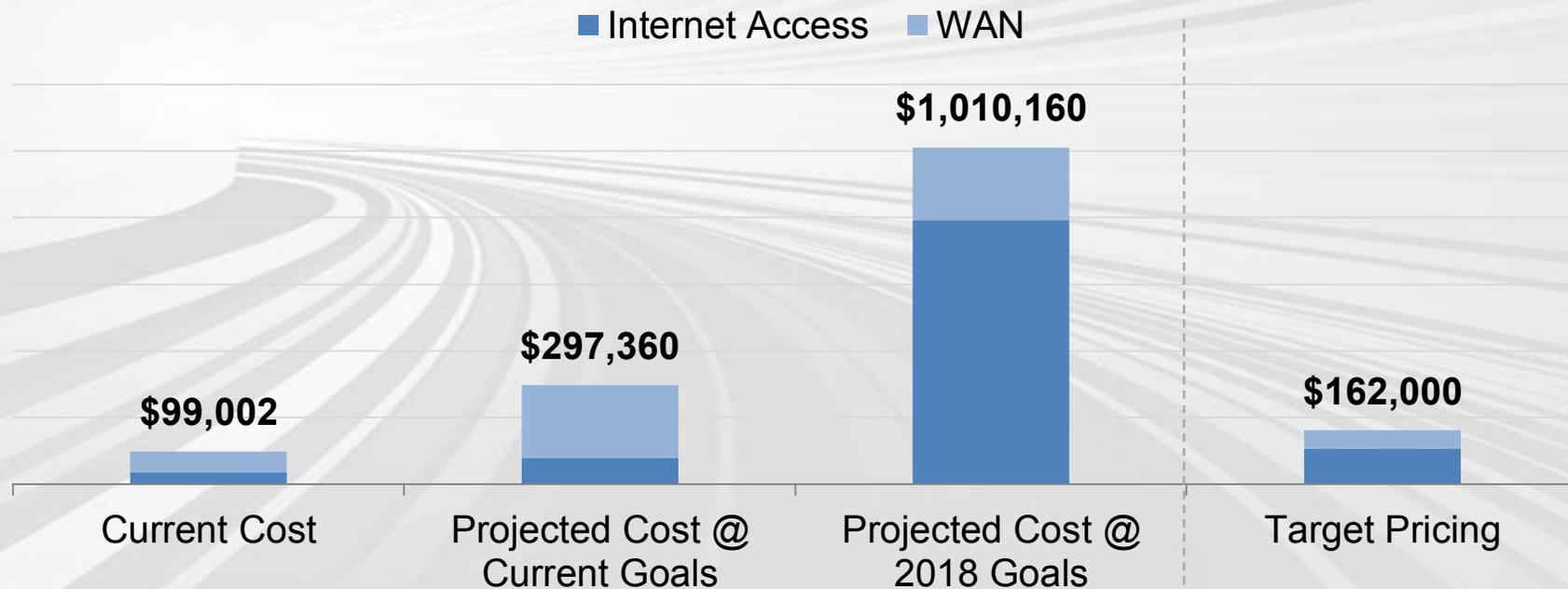


Closing the Gap: Improve Affordability



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

Estimated Annual Cost per District



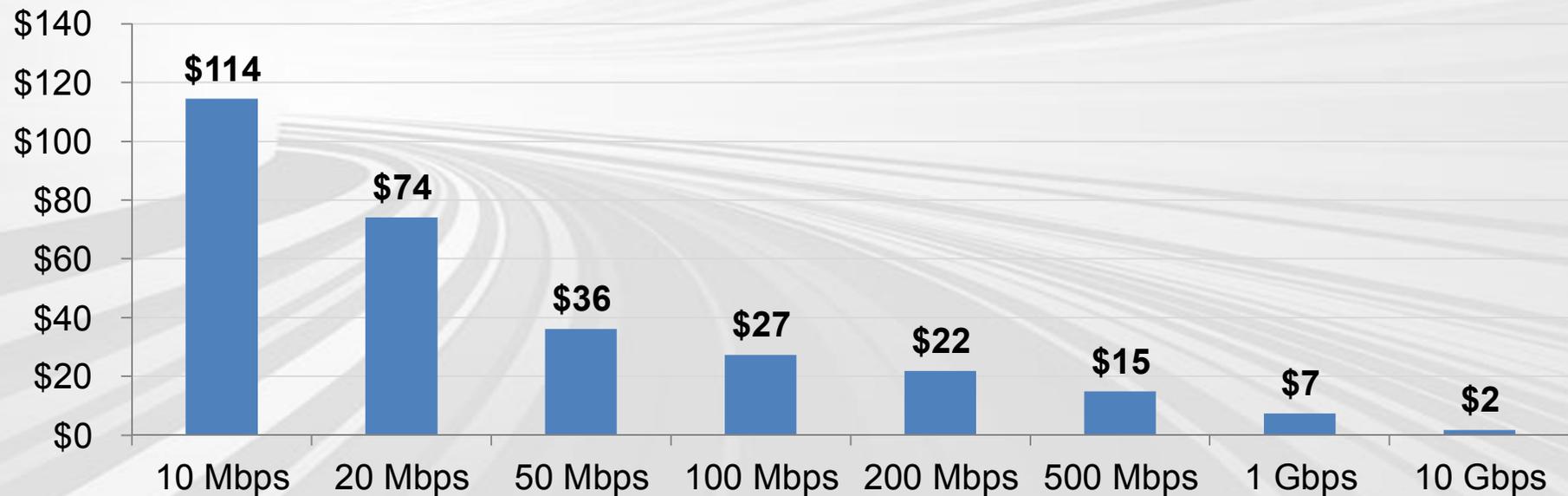
Average district: 6 schools, 3,000 students

Scale of Procurement



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

Internet Access: Monthly cost per Mbps

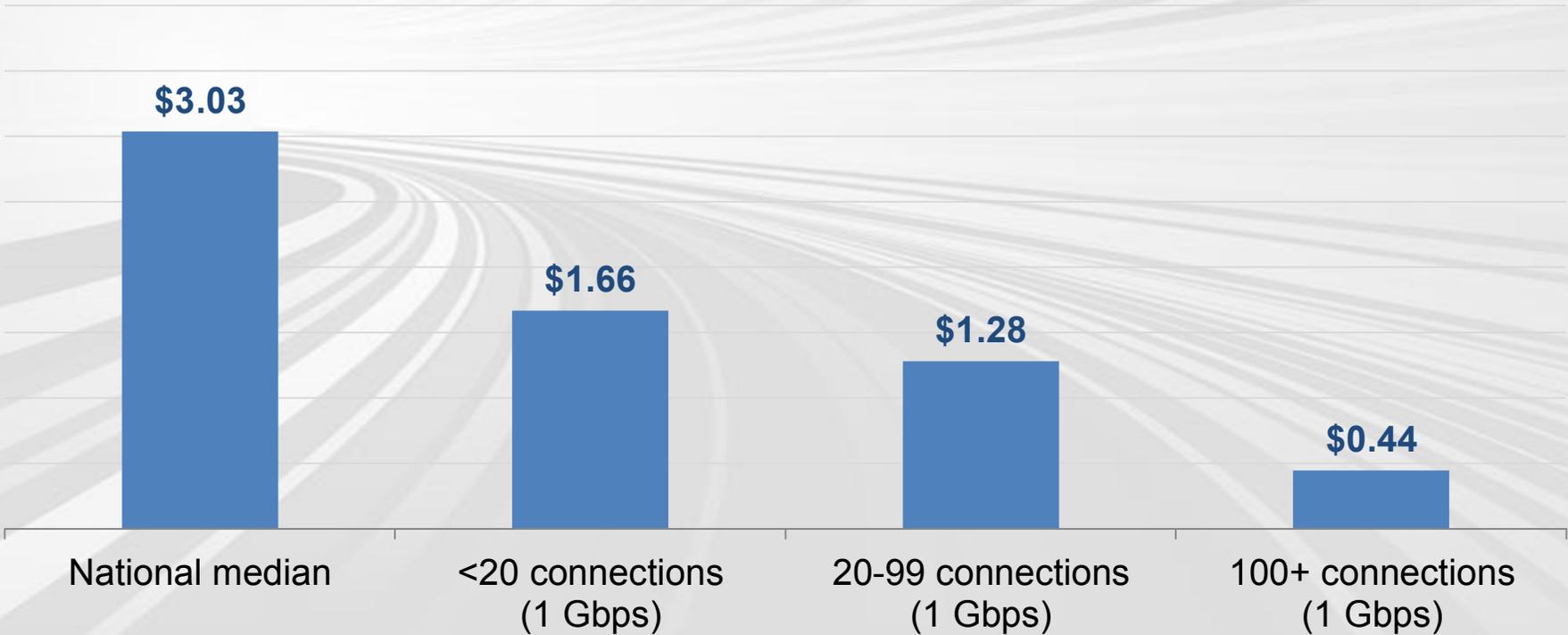


Source: EducationSuperHighway *Connecting America's Students: Opportunities for Action*

Aggregate Demand Across Districts

Regional contracts are often most cost effective

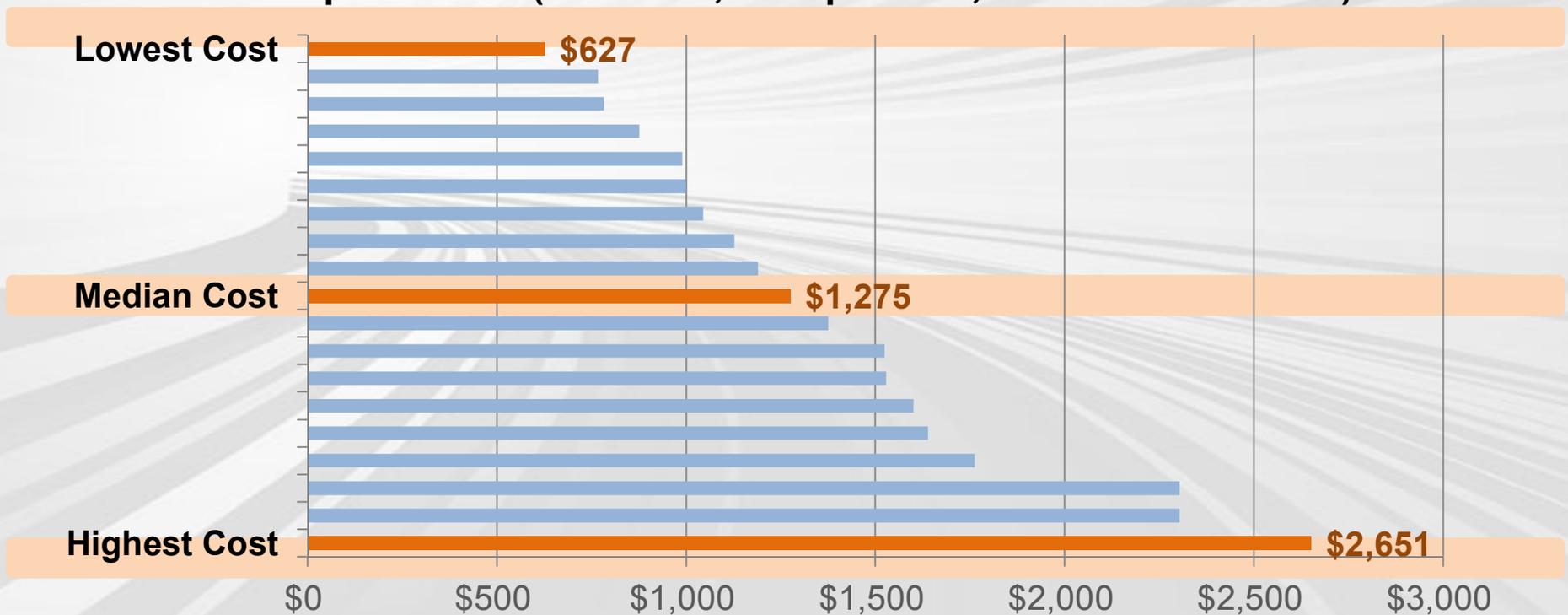
District WAN Cost per Mbps



Create Transparency of Pricing



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



Increase Competition and Choices

District WAN: Monthly Cost per Connection



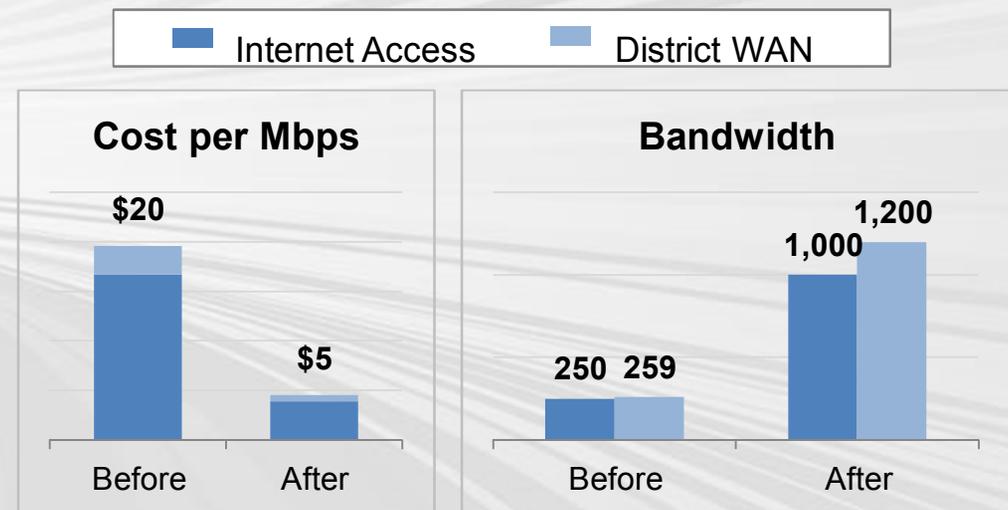
Case Study: Indian Prairie School District



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



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



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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>.
- 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>
- 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>,
- 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>.

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  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

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www.shlb.org



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A photograph of a rural landscape. In the foreground, there is a vibrant green lawn. A paved road curves from the left towards the center. To the right of the road is a large field of mature, golden-brown corn. In the background, there are rolling hills and a sky filled with soft, white clouds. A utility pole stands near the road.

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

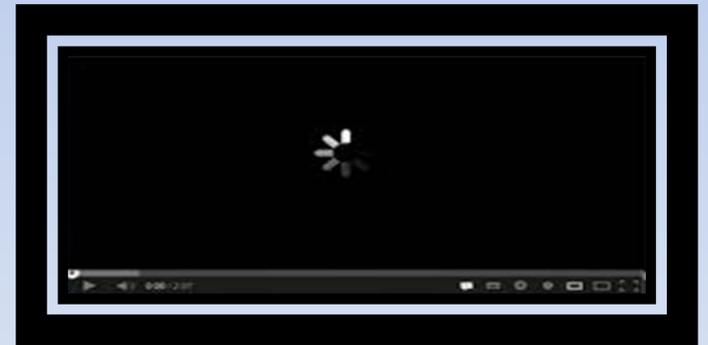
- Internet and intra-district connectivity to elementary buildings = problem.

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



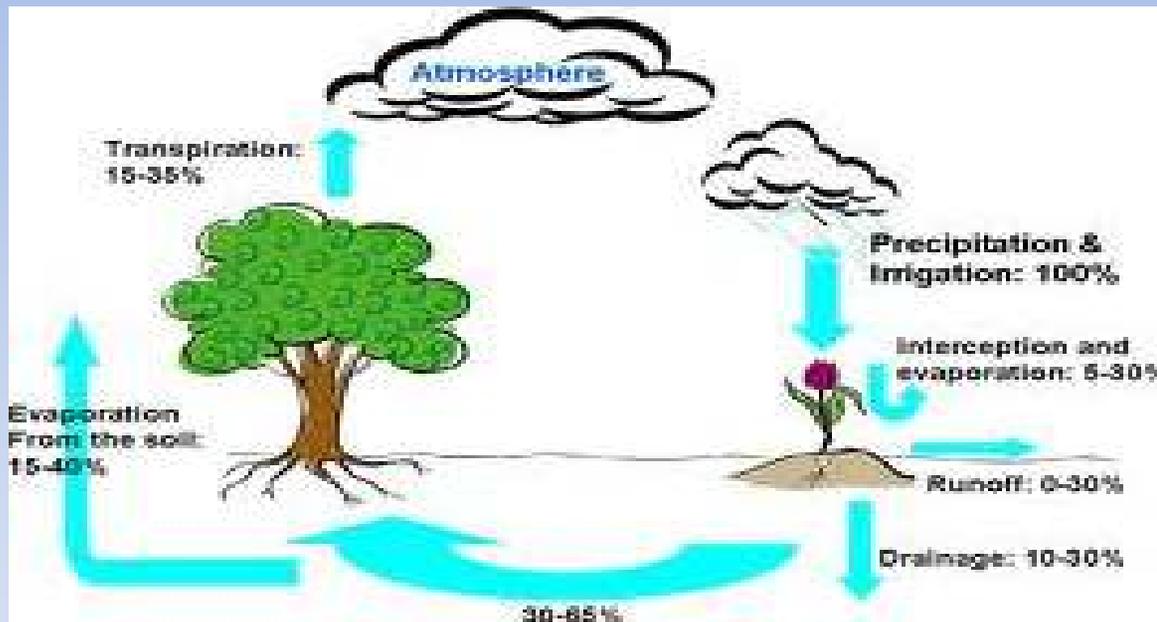
Access Ontario

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?



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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?



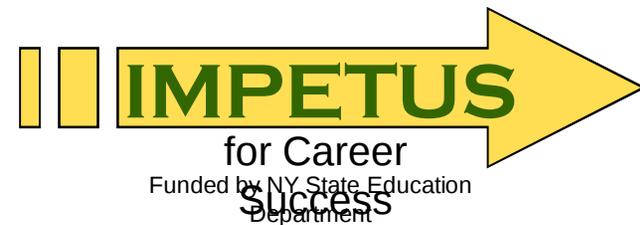
IMPETUS

for Career
Funded by NY State Education
& Choice





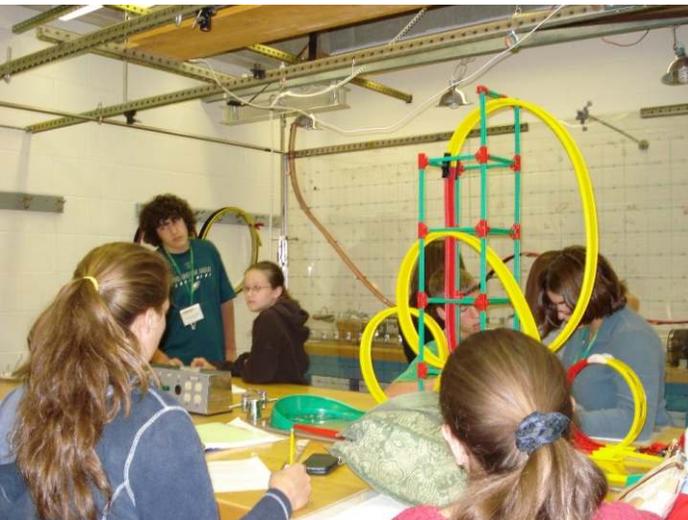
Some of our activities: Broadband contribution



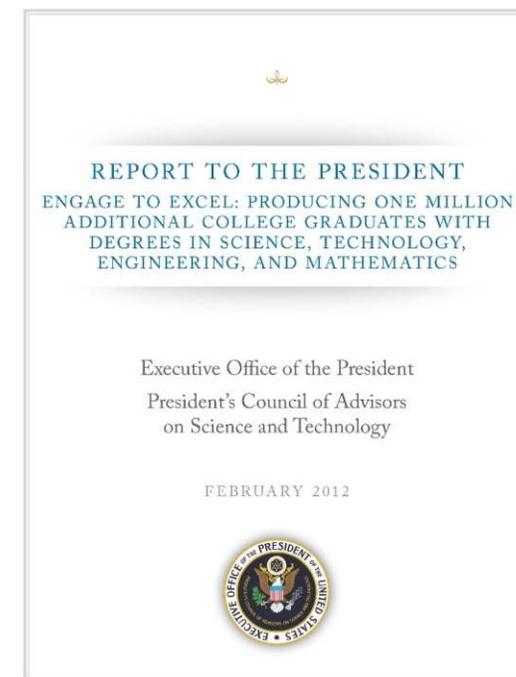
Roller Coaster Project (grades 7-12)

- 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”
- INGenIOuS
- Curricular concerns
- Relevance provides motivation
 - But many teachers are not prepared
 - PD is needed

The Mathematical Sciences in 2025

A vertical collage of three images. The top image shows a chalkboard with mathematical equations. The middle image shows a person's hands writing on a whiteboard. The bottom image shows a glowing, abstract representation of mathematical structures or data.

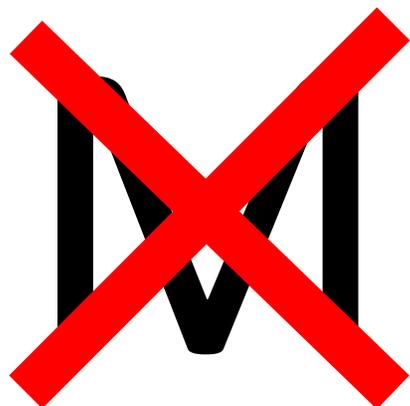
NATIONAL RESEARCH COUNCIL
ON SCIENCE AND TECHNOLOGY



Why this focus on Math?



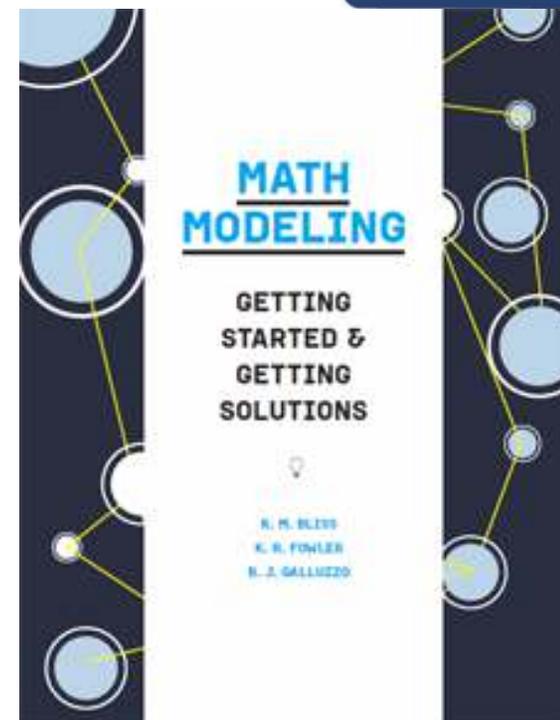
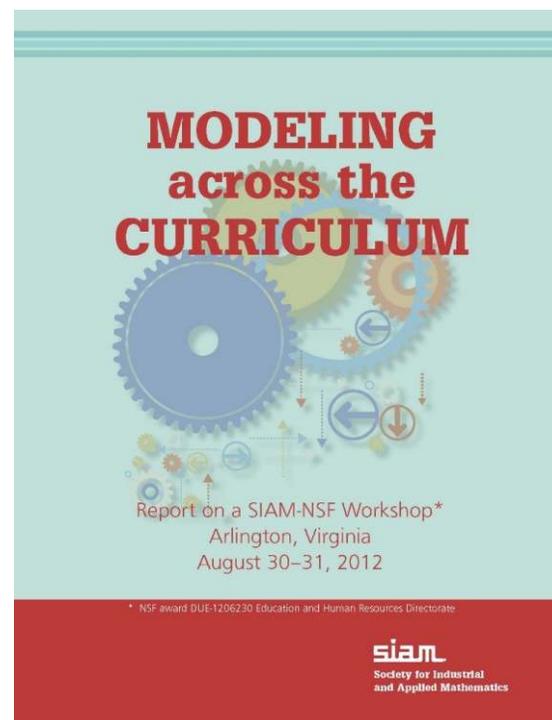
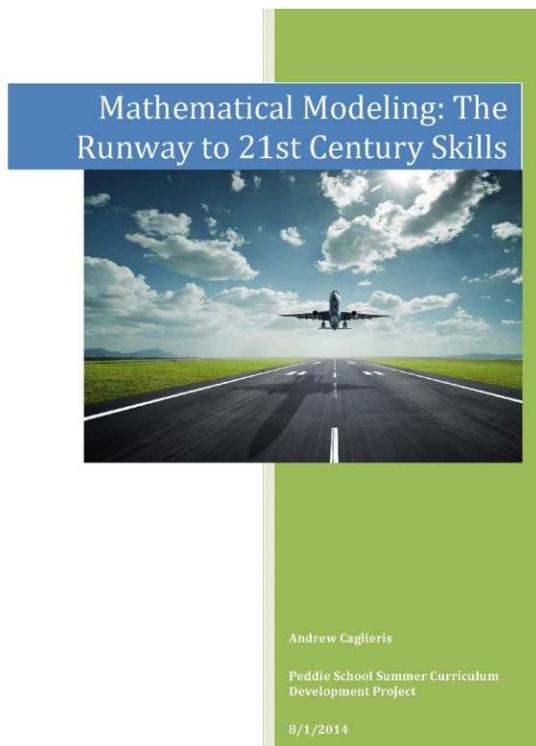
STEM



Biggest obstacle to success in transition to college STEM programs

doesn't happen

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



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