Education SUPERHIGHWAY

2018
STATE OF THE STATES

OCTOBER 2018

Expanding digital learning to every classroom, every day

Table of contents

STATE OF THE STATES

3 A letter from Founder and CEO Evan Marwell

4 National Highlights: 40.7 Million Students Connected Since 2013

12 A Clear Path to Connecting Every Student

18 Meeting the Demands of Today's Digital Classrooms

24 Blueprints for Success

28 About the Data

30 About EducationSuperHighway

A letter from Founder and CEO Evan Marwell

As we kick off the 2018 school year, we can celebrate that 40.7 million more students have high-speed broadband than just five years ago.

Five years ago, an unprecedented coalition united behind a simple, but important, goal: to improve broadband in America's K-12 classrooms. They took on this mission because in every classroom without adequate broadband, students were being shortchanged. They didn't have access to the educational applications and content available in connected classrooms, and they were at a significant disadvantage in trying to compete in today's digital world.

So the goal was set: connect 99% of schools to next-generation broadband. It was an audacious goal—not a single state had the infrastructure and bandwidth needed to meet this goal in 2013.

Piece by piece, progress was achieved. The Federal Communications Commission (FCC) modernized the E-rate program. Forty-nine governors pledged to make improvements in every corner of their states. Thousands of school district leaders worked to find the solutions for their students, and service providers dramatically improved the affordability of broadband.

The result is incredible progress. Today, 98% of our public schools have next-generation fiber infrastructure, and 96% have enough Internet connectivity to make digital learning available in their classrooms.

As we kick off the 2018 school year, we can celebrate that 40.7 million more students have high-speed broadband in their classrooms. But our job is not done. 2.3 million students and 1,356 schools still need the basic infrastructure for 21st-century learning. We also need to embrace the FCC's 2018 goal of 1 Megabit per second (1 Mbps) per student of Internet access, so technology can be fully integrated into teaching and learning throughout our schools.

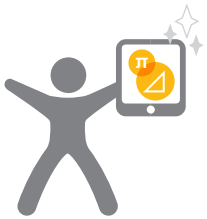
In 2013, we came together to ensure every student had equal access to educational opportunity through digital learning. If we keep working together, we'll finish that job in the next two years and be well on our way to making digital learning a reality in every classroom, every day.

With gratitude for all your efforts on behalf of America's K-12 students.

Many thanks,

Evan Marwell
Founder and CEO
EducationSuperHighway

WHERE WE STAND



44.7 M
students connected

2.6 M
teachers connected

81,000
schools connected

2.3 MILLION
more students
still left to connect

National Highlights:
40.7 Million Students Connected Since 2013

01 National Highlights

In 2013, a bipartisan coalition—from the FCC to governors to school officials and Internet service providers—joined together to end the digital divide in our nation's classrooms. As a result, 40.7 million more students have high-speed Internet access than did in 2013.

44.7 million students and 2.6 million teachers[1] in more than 81,000 schools now have the Internet access they need for digital learning.

This impressive progress continued during the 2017-18 school year. The number of students without high-speed Internet access was reduced by 4.2 million and the number of schools without 21st-century broadband infrastructure declined by 34%. So, as the new school year begins, 98% of America's K-12 school districts—both rural and urban—have the broadband infrastructure and Internet access they need for digital learning.

OUR NATION'S CONNECTIVITY PROMISE

In 2014, the FCC modernized the E-rate program. That was the first step in delivering on our nation's promise to connect America's public school students. The FCC established three connectivity goals:

1. 100 kilobits per second (kbps) per student of Internet access, the minimum recommended bandwidth to enable digital learning in the classroom. Starting this year, the FCC raised the goal to 1 Mbps per student.
2. Fiber connections to every school, so that school bandwidth can reliably grow over time.
3. Wi-Fi in every classroom to support programs where every student has a device.

The effort to connect America's students to 21st-century learning has made great progress. Today, 98% of school districts meet the FCC's 100 kbps per student goal for Internet access, an increase of 40.7 million students since 2013. This rapid growth in connectivity has reached across the country, from rural schools in Texas to urban districts in New York and throughout states as varied as Colorado, Georgia, North Dakota, and Washington.

Chart 1: 98% of school districts can now take advantage of digital learning

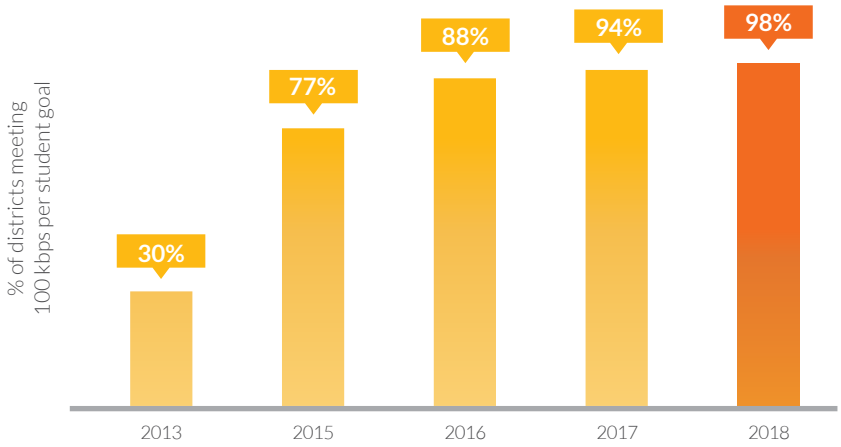
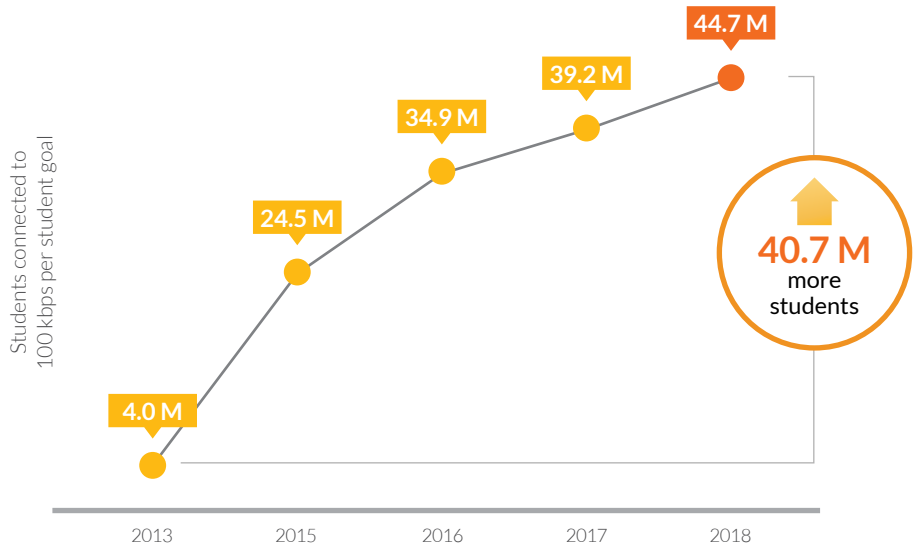
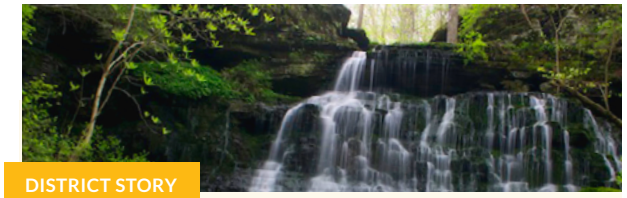


Chart 2: The number of students with access to the broadband they need for digital learning grew from 4 million in 2013 to 44.7 million today





DISTRICT STORY

TECHNOLOGY FOR ALL

Tullahoma City Schools

In Tullahoma, you can find robust examples of technology use throughout its classrooms thanks to a 1:1 program supported by a 300 kbps per student Internet connection. In the music wing, students use a program that both teaches them concepts and records their practice, allowing their teacher to effectively review their work quickly. Elsewhere, teachers use the Google Earth and Map apps to help make new English-language learners feel more at home. District-wide, teachers use Google Classrooms and the open educational resource CK-12 to create customized materials for their students. Explaining his district's transformation over the last five years, the Tullahoma superintendent says, "We're embracing change. Students live in a digital environment now and their schools must too."

We have dramatically boosted the infrastructure needed to deliver high-speed broadband to each classroom.

To make sure every classroom has the high-speed broadband needed for digital learning, every school needs a fiber-optic (or alternative scalable bandwidth) connection and a Wi-Fi access point in each classroom. In the last five years, the number of schools without scalable broadband connections has shrunk by 94% and school districts have invested nearly $3 billion to upgrade their Wi-Fi networks.

Chart 3: 98% of schools have the fiber-optic connections needed to meet current and future connectivity needs

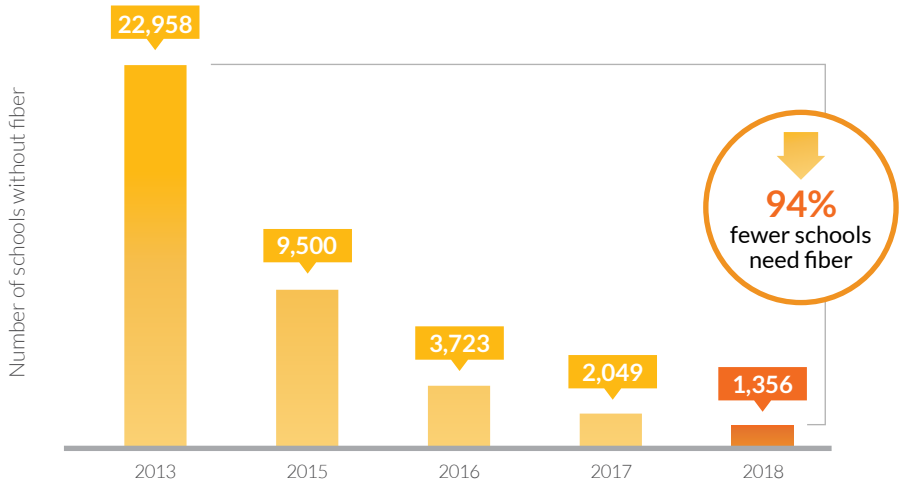
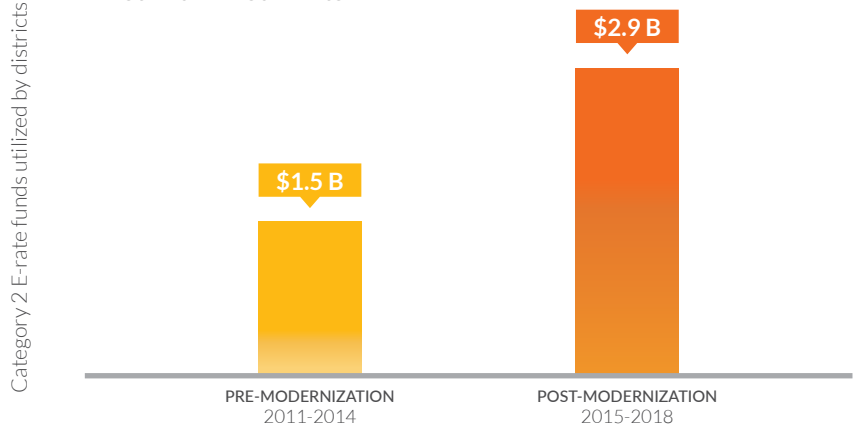


Chart 4: E-rate modernization has dramatically increased school district investments in Wi-Fi

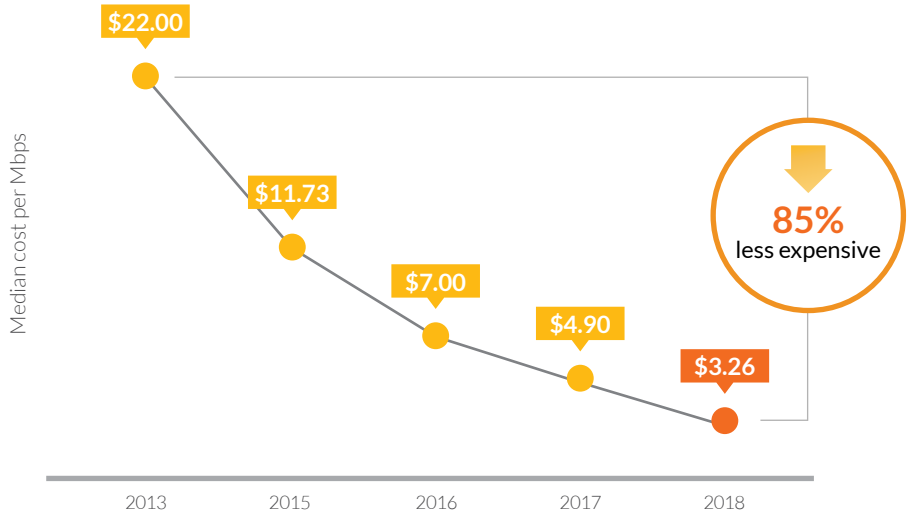


From 2011 to 2014, one of every seven school districts in the country received Category 2 E-rate funds, spending $1.5 billion on Wi-Fi networks. Since 2015, more than eight of 10 school districts used Category 2 funding and the amount spent on Wi-Fi nearly doubled to $2.9 billion.

Service providers continue to significantly reduce the cost of broadband for our nation's schools.

The cost of broadband access has continuously decreased since 2013 thanks to price transparency and technological improvements that have enabled service providers to bring school districts significantly more bandwidth at the same cost. This momentum continued in 2018 with service providers trimming 33% off of Internet access costs.

Chart 5: The cost of K-12 Internet access has declined 85% in the last five years



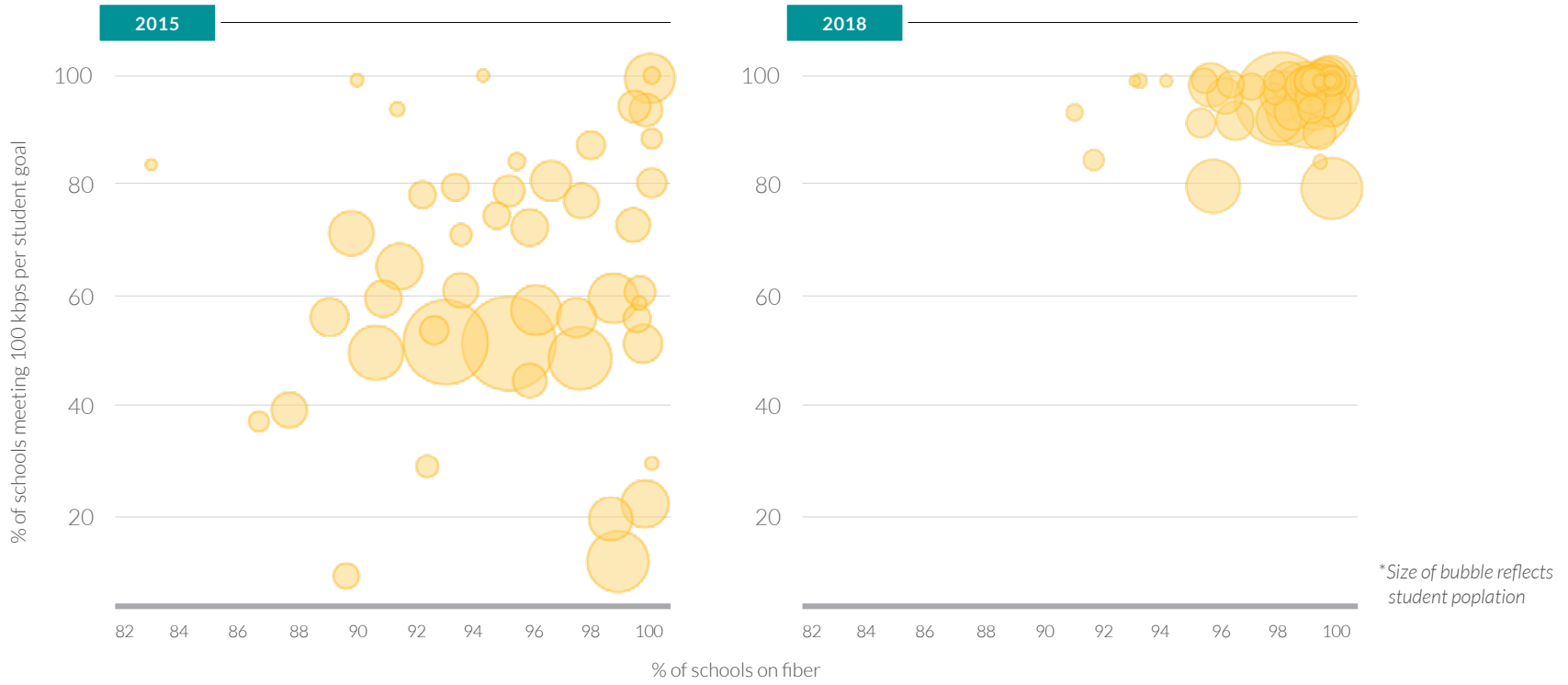
THE IMPORTANCE OF STATE LEADERSHIP

The progress made toward closing the digital divide in today's K-12 school districts is the direct result of the bold leadership and bipartisan cooperation of governors, state legislatures, broadband leaders, and state education departments. Since 2013, governors in 49 states stepped up and committed to connect their students to high-speed broadband by:

- **Setting statewide connectivity goals**
- **Supporting school districts with procurement and technical expertise**
- **Creating state-matching funds for fiber construction**
- **Partnering with service providers to improve the affordability and access to broadband**

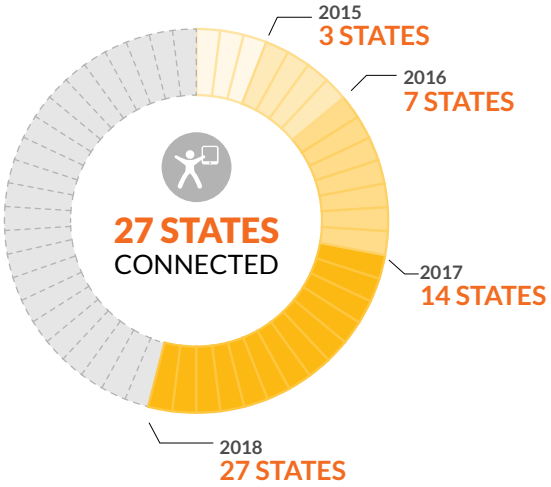
As seen in the chart below, these actions have resulted in every state making dramatic progress toward meeting the FCC's 100 kbps per student Internet access goal and connecting their schools to fiber.

Chart 6: In three years, states have made tremendous progress connecting schools to the bandwidth and fiber needed for digital learning



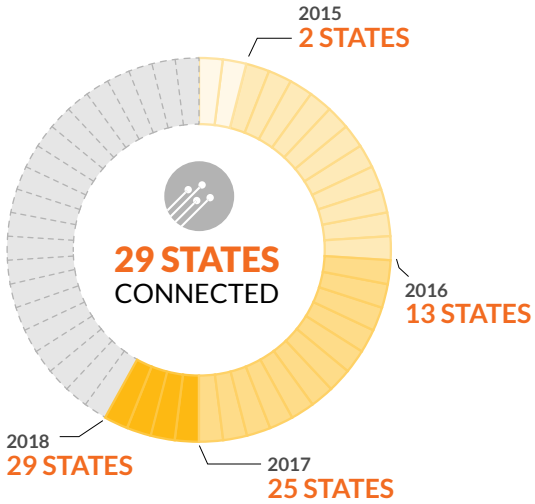
BANDWIDTH

In 2015, just three states had 99% of their schools connected to 100 kbps per student of Internet access. Today, 27 states are reaching that benchmark, two-thirds of which (18 states) are also meeting the fiber goal.



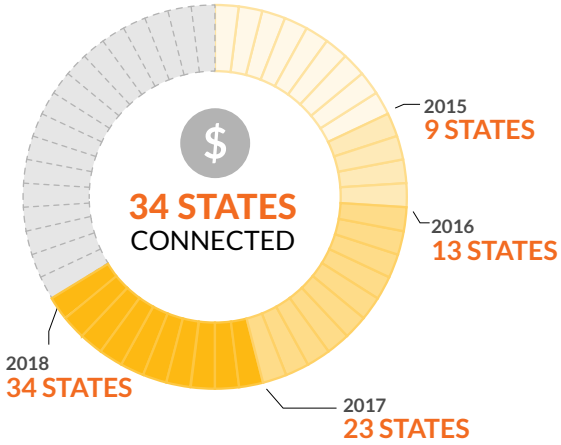
FIBER

In the last four years, an additional 27 states have connected 99% of their schools to fiber—bringing the total number of states that have 99% of their schools on fiber to 29.



AFFORDABILITY

Since 2015, 25 more states have lowered the cost of broadband below the $3 per Mbps benchmark, ensuring sufficient E-rate funding is available for schools to upgrade to 1 Mbps per student.



A Clear Path to Connecting Every Student

02

A Clear Path to Connecting Every Student

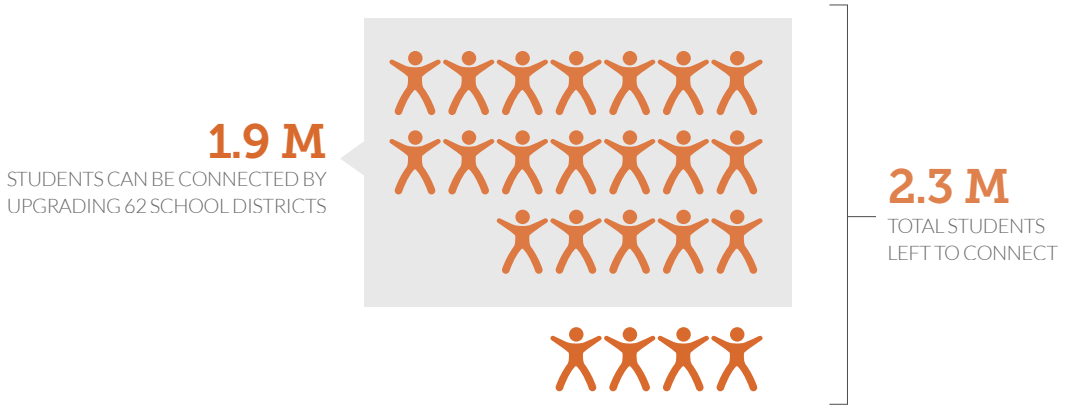
2.3 M
students still left to connect

1,356
schools still need fiber

We are on the verge of accomplishing a historic task. Only 2.3 million students remain without adequate high-speed Internet access, and only 1,356 schools lack fiber or other scalable broadband infrastructure. Fortunately, there is a clear path to meeting our goal of connecting 99% of schools to next-generation broadband.

Upgrading 62 school districts will finish the job of connecting 99% of students

Nearly two million of the 2.3 million students who still do not have access to the FCC's 100 kbps per student Internet access goal are in just 62 school districts. Upgrading these districts would not only finish the job of connecting 99% of students to high-speed broadband but would mean that 41 states would have 99% or more of their students meeting the FCC's goal.



Eighty-seven percent of these districts, representing 1.7 million students, can meet the 100 kbps goal by simply getting the same bandwidth pricing as peer districts in their state.[2] A peer district is one of similar locale and size within a state. On average, we found 30 peer deals for each of these districts, meaning there's not just one deal that would allow them to upgrade to 100 kbps or more per student at no additional cost.

ANOTHER 179 SCHOOL DISTRICTS NEED BANDWIDTH UPGRADES AND ALREADY HAVE THE INFRASTRUCTURE THEY NEED

While upgrading 62 school districts will enable the nation to reach its 99% goal, there are another 179 districts serving approximately 400,000 students that need bandwidth upgrades to bring digital learning to their classrooms. Importantly, 99% of these districts already have the scalable broadband infrastructure they need to increase their Internet connectivity.

Here's the path to upgrade these districts:

- 55% have peers with deals from their current provider that would allow them to reach the 100 kbps per student goal at no additional cost
- 32% have peer deals available if they change service providers
- 5% are part of consortia where most schools are already receiving in excess of 100 kbps per student of Internet access
- 8% need to invest more in their connectivity to meet the goal

Nearly half of these districts had one or more peer deals available from their current service provider. This means that 633,000 students can be connected to the bandwidth they need for digital learning without their districts having to switch providers. In reality, during the 2017-18 E-rate cycle, 72% of the districts that upgraded to meet the 100 kbps per student goal did so with their current service provider. This suggests that existing providers are highly likely to meet competitive pricing options to retain school district customers and that approximately 1.3 million students could be upgraded without switching providers—the quickest path to digital equity.

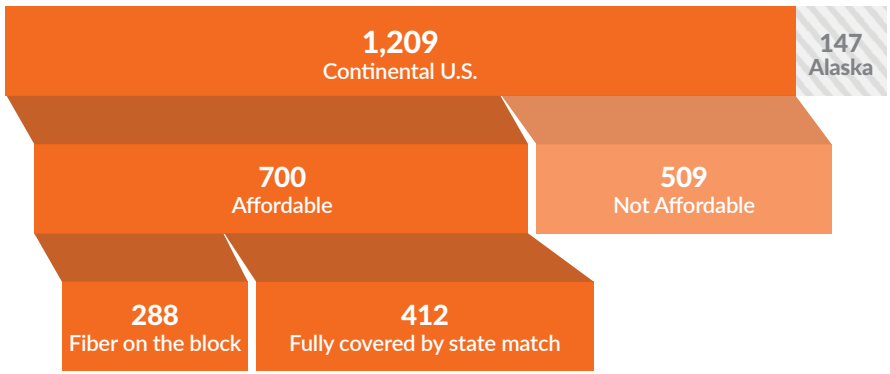
The remaining 200,000 students in these 62 school districts need their district leaders to invest more in broadband. Today, these districts invest 92% less per student than the average district meeting the FCC's 100 kbps per student goal. If these districts invest, on average, an additional $0.95 per student per year in Internet access, their students will have the minimum connectivity needed to make digital learning available in their classrooms.

700 schools can affordably upgrade to fiber—enough to connect 99% of schools

To handle today's digital learning demands and the need for additional bandwidth in the future, schools need scalable broadband infrastructure. For the vast majority of schools, this means fiber.

In the last year, we reduced the number of schools without fiber or other scalable broadband connections by 34%. Of the remaining 1,209 schools in the continental U.S. that still need fiber, 700 have affordable upgrade options.[3] Of these, 38% are in locations where a service provider already has fiber on the block and there is most likely no upfront cost to the school district to connect the school to fiber. Fifty-nine percent can be upgraded to fiber at no cost because the combination of E-rate and their state's fiber-matching fund will cover the entire cost of the build.[4] By helping all of these schools take advantage of these affordable options, we will surpass the nation's goal of connecting 99% of schools to fiber and increase the number of states meeting this goal to 40.

Chart 7: 700 schools have affordable fiber upgrade options



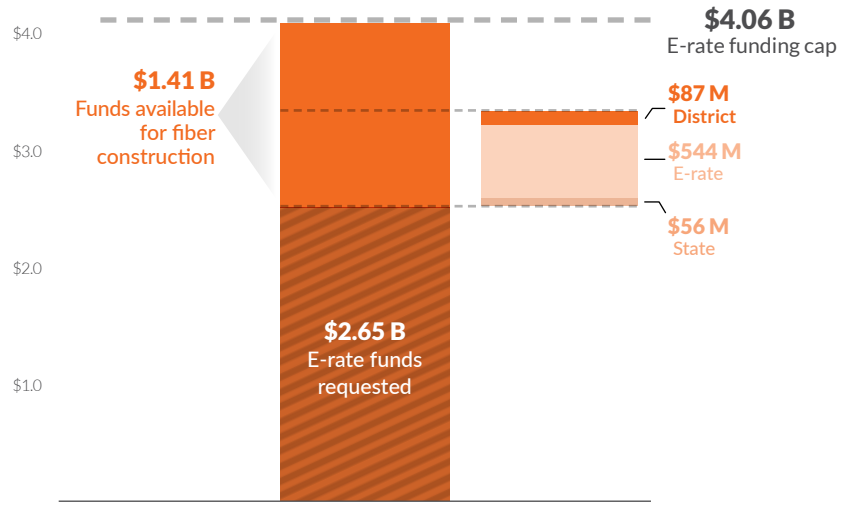
State leaders can help ensure that schools with affordable fiber options take advantage of the opportunity to upgrade their broadband infrastructure. Three primary factors prevent these upgrades from happening: school district technology directors cannot get approval from district leaders; districts do not know they have an affordable option or how to access it, and districts are unable to navigate the E-rate application process. Across the country, state leaders are implementing solutions to these roadblocks (see sidebar). They are educating superintendents and school boards on the benefits of digital learning and the need for scalable broadband infrastructure. They are helping school districts prepare requests for proposals (RFP) and recruit service providers to bid on those RFPs. And they are providing resources to help districts file E-rate applications. Broadly implemented, these actions should ensure that every school with an affordable option gets the broadband infrastructure it needs today and for the future.

Two existing federal programs could make fiber upgrades affordable for all schools

Unfortunately, 509 schools in the continental U.S. are unlikely to get the scalable broadband they need. These schools face costly fiber builds and are currently required to contribute an average of $167,000 toward these builds—an amount that is clearly beyond their means. Overall, we estimate that $87 million of funding would be required to make upgrades affordable for these 509 schools.[5]

In order to ensure that no school is left without scalable broadband and access to digital learning, we now need renewed leadership at the federal level. There are two existing funding sources that could be used to ensure every school has an affordable fiber upgrade option. The first is the E-rate program. In 2018, total funding requests were approximately $1.41 billion less than the E-rate funding cap, leaving plenty of resources available to make fiber upgrades affordable for all schools.

Chart 8 : Existing E-rate funding is sufficient to bring fiber to all schools at no cost to school districts



STATES ARE TAKING ACTION TO CLEAR THE WAY FOR AFFORDABLE FIBER UPGRADES

- Virginia's K-12 Learning Infrastructure Program is educating superintendents and school boards on the potential of digital learning and the importance of scalable broadband infrastructure. It also provides E-rate and procurement expertise and training and is launching a district-led initiative to close the homework gap across the Commonwealth.
- New Mexico's Public School Facilities Authority provides RFP templates and one-on-one technical support to school districts in need of fiber upgrades.
- Nevada hired a team of E-rate experts to work closely with each of its school districts during the E-rate cycle. The consultants support activities including network assessment, RFP planning, bid evaluation, vendor selection, and upgrade implementation—all as a free service for the districts.

RED TAPE IS SLOWING STUDENTS' ACCESS TO EDUCATIONAL OPPORTUNITY

In 2018, nearly 350 school districts applied for $430 million in E-rate special construction funding to bring fiber to their unconnected schools. These projects were a key part of the progress made to increase the number of schools with high-speed broadband infrastructure. Many of these projects leveraged state fiber construction matching funds to overcome the financial roadblocks to connecting these schools. In short, they were the kinds of projects the E-rate program was meant to fund.

Unfortunately, red tape in the E-rate application review process is preventing construction from starting in these school districts. As of the FCC's September 1 deadline for reviewing E-rate applications, none of the special construction projects submitted had received funding decisions.[6]

This not only keeps students from getting the broadband they need for digital learning, but it puts the projects at risk of missing the fall construction window and potentially losing the state matching funds that have brought hope to these largely rural schools.

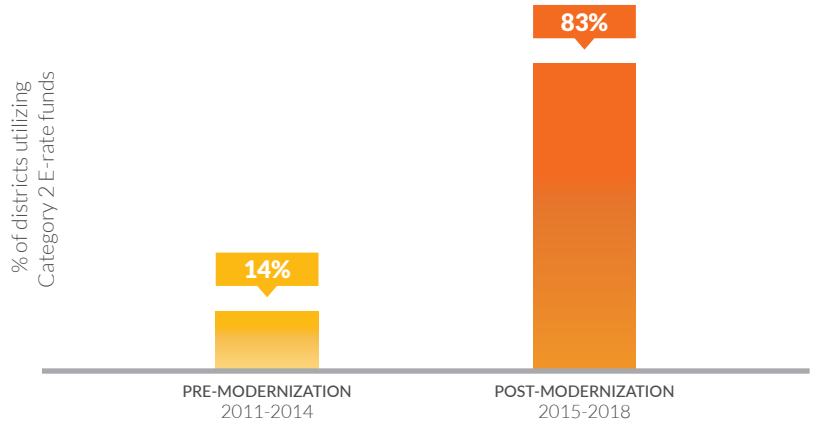
The FCC has made tremendous progress in speeding up the review of E-rate applications in 2018, but not for fiber projects. Unfortunately, it has put the most important applications, those for students with no other options, at the bottom of the pile. It has also subjected these applications to a level of scrutiny and capricious decision making—unlike similar fiber applications that don't request special construction funding. To meet the nation's goal of connecting 99% of our schools to scalable broadband infrastructure, we need the FCC to put fiber first.

The second funding source is the U.S. Department of Agriculture's (USDA) Community Connect Grant Program, which is part of the USDA broadband program that received $600 million of new funding in the 2018 federal budget. Fiber construction to public schools is an eligible use of these funds, and the potential impact compares favorably to projects that USDA funded under this program in 2018. In August, the USDA committed $97 million to bring broadband to as many as 22,000 subscribers. Investing just $87 million would bring fiber and high-speed broadband to approximately 200,000 students. It would also bring high-speed broadband infrastructure to the area, enabling service providers to connect not just the schools but the entire community.

Bringing Wi-Fi to every classroom

To make digital learning a reality in the classroom, high-speed connections must be paired with robust Wi-Fi networks. Since 2015, E-rate modernization has made it possible for more than 10,000 school districts to invest in their Wi-Fi networks—six times as many as were able to do so in the four years prior to E-rate modernization.

Chart 9: E-rate modernization has enabled 83% of school districts to invest in Wi-Fi upgrades

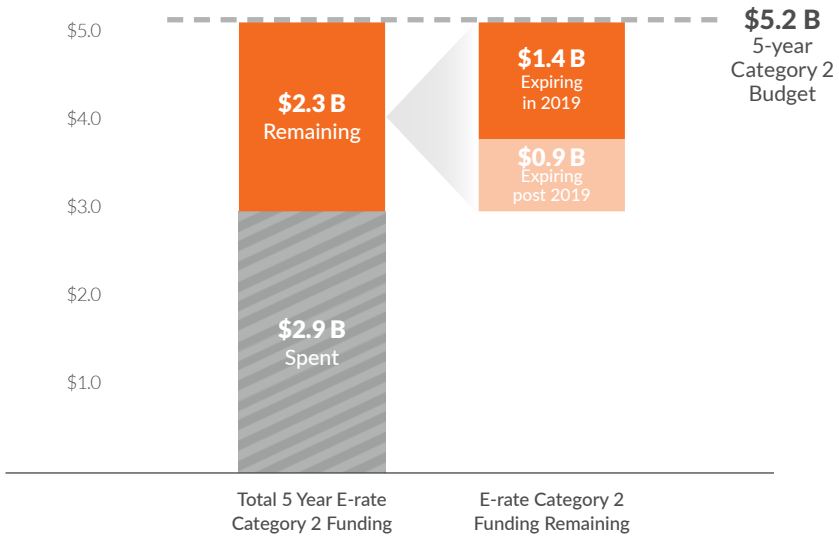


E-rate modernization made additional Wi-Fi funding available to all school districts. Specifically, it allotted $150 per student per school to be spent on internal connections upgrades over the course of five years. Despite the increased investment we have seen by many school districts in the last four years, 2,125 school districts have not taken advantage of the $150 per student E-rate Category 2 funding to upgrade their Wi-Fi networks. These districts are at risk of losing more than $320 million of funding if they don't utilize at least a portion of their $150 per student budget in the 2018-19 E-rate cycle.[7]

State leaders have an essential role to play in ensuring that these districts don't lose their Category 2 funding. School district surveys reveal that the number one reason these districts have not used their Wi-Fi funding is that they did not know the funding was available. To combat this issue, many states are conducting outreach campaigns to these districts to ensure they know that their funding is at risk of expiring and to provide technical and procurement assistance if districts need help utilizing these resources.

States are also conducting outreach to a second group of school districts with expiring funds. Nearly 5,700 districts are in the final year of their five-year window to spend their Category 2 resources. All of these districts spent a portion of their $150 per student budget in the 2014-15 E-rate cycle and collectively have over $1.1 billion in unused funds that will expire this year. Among this group are more than 1,400 school districts that have over 50% of their funds remaining. Many of these schools are not aware that their funds expire this year, so state outreach can play an important role in ensuring students in these districts have the Wi-Fi they need to bring high-speed broadband and digital learning to their classrooms.

Chart 10: More than $1.4 billion in E-rate funding is at risk if school districts do not act this year

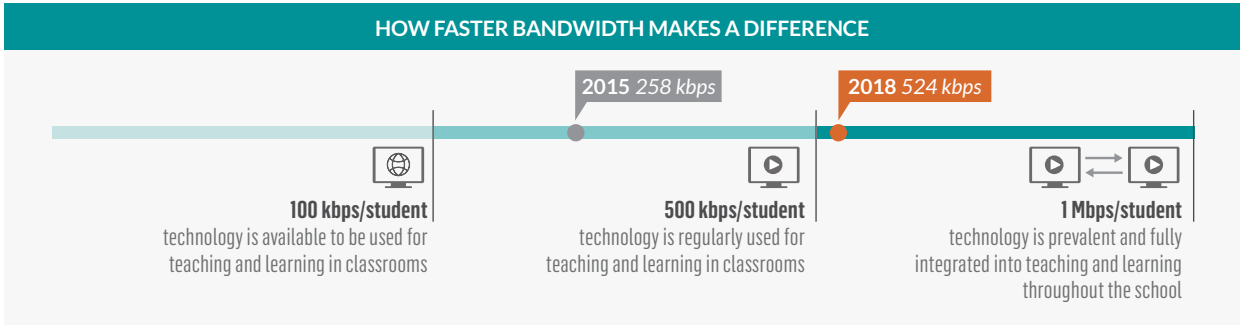


Meeting the Demands of Today's Digital Classrooms

03

Meeting the Demands of Today's Digital Classrooms

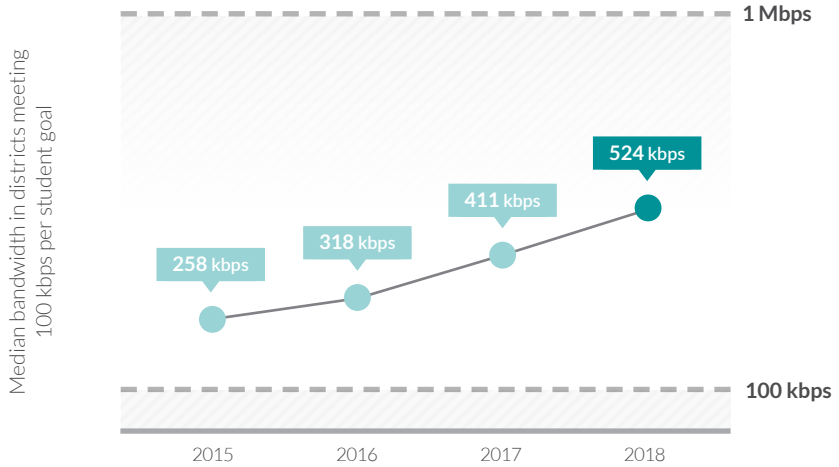
Reaching the FCC's 100 kbps per student goal opens the door to digital learning opportunities. It allows teachers to begin transforming their classrooms—engaging students with digital content, leveraging online applications to teach in new ways, and obtaining more rapid feedback on how students are progressing. It also lets students begin taking control of the pace of their learning and make it more relevant with technology-enabled project-based learning experiences. But **this is not the finish line; it's a starting point**. Once digital learning enters a school, bandwidth demand continues to rise. Students and teachers find more ways to enhance the learning experience with technology, and other teachers begin using it in their classrooms. Ultimately, digital learning becomes fully integrated into teaching and learning throughout the school as teachers leverage technology in every classroom, every day.



> ***In Arkansas, our students are developing 21st-century skills in the classroom to succeed in tomorrow's workforce. This requires high-speed Internet access in every school - which is why we upgraded the Arkansas Public School Computer Network and can now provide 1 Mbps per student to 98% of the school districts.***
>
> Arkansas Governor
> Asa Hutchinson

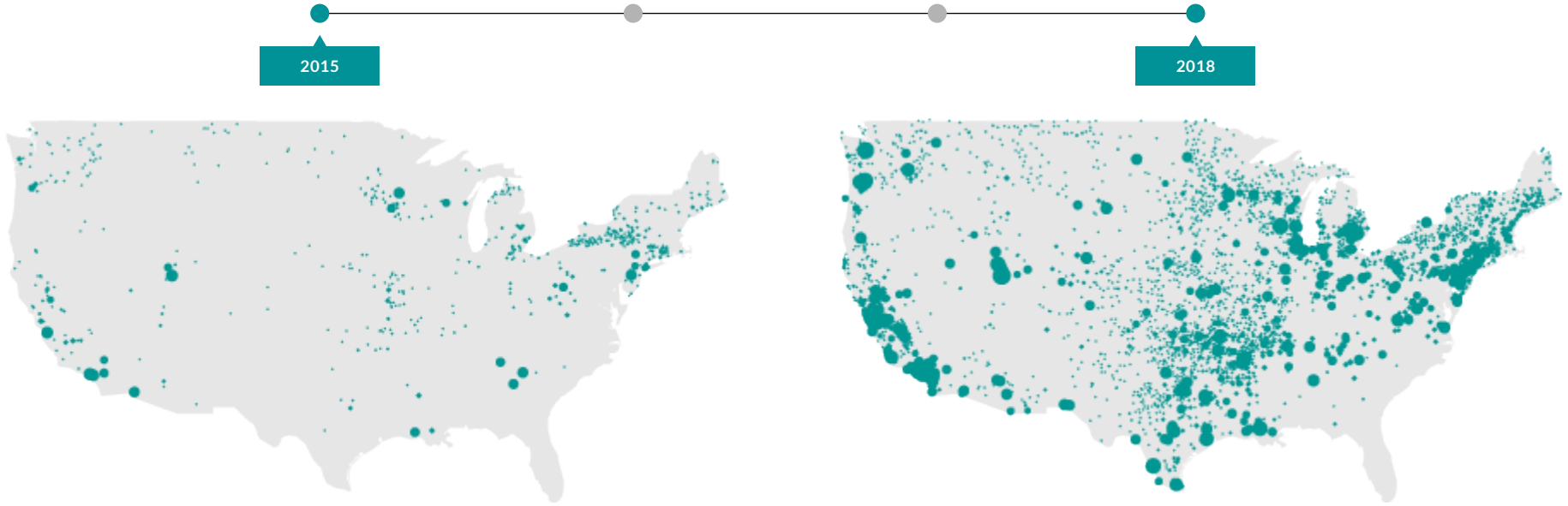
To keep up with the increasing adoption of technology in their classrooms, schools need to continue to grow their bandwidth. A majority of educators have realized this and continue to position their schools for the future. Two-thirds of districts that hit the 100 kbps per student goal have continued to boost their bandwidth with at least one upgrade since meeting the goal. As a result, in districts that reached the 100 kbps per student goal, the median bandwidth per student topped 500 kbps last year, a nearly 28% increase from 2017.

Chart 11: Digital learning adoption is driving schools to upgrade beyond the 100 kbps per student minimum connectivity threshold



The FCC also understood that 100 kbps per student was just a starting point. That's why as part of E-rate modernization in 2014 they set a second bandwidth goal for schools: 1 Mbps per student by 2018. And school district leaders agree. Twenty-eight percent of all school districts—and 15% of the nation's 1,000 largest districts—have already upgraded to this new goal. As a result, for the first time we have more students (6 million) with 1 Mbps per student of bandwidth in their classrooms than students who are still waiting for digital learning in their schools (2.3 million).

Chart 12: Four times as many school districts are meeting the 1 Mbps per student goal—including 15% of the 1,000 largest districts



BANDWIDTH UPGRADES EXPAND CURRICULUM OPTIONS

The need to improve bandwidth in Tyler Independent School District (Texas) was as clear to its executive director of technology as a spinning wheel on a computer screen. "We were getting complaints from teachers and principals [about poor performance]," the director said. After upgrading to a 1 Mbps per student connection those problems are in the rear-view mirror and the district has been able to start an Early College High School where 300 students are taking classes for high school and college credits simultaneously. "Everywhere we turn, tech is playing a key role in our instruction."

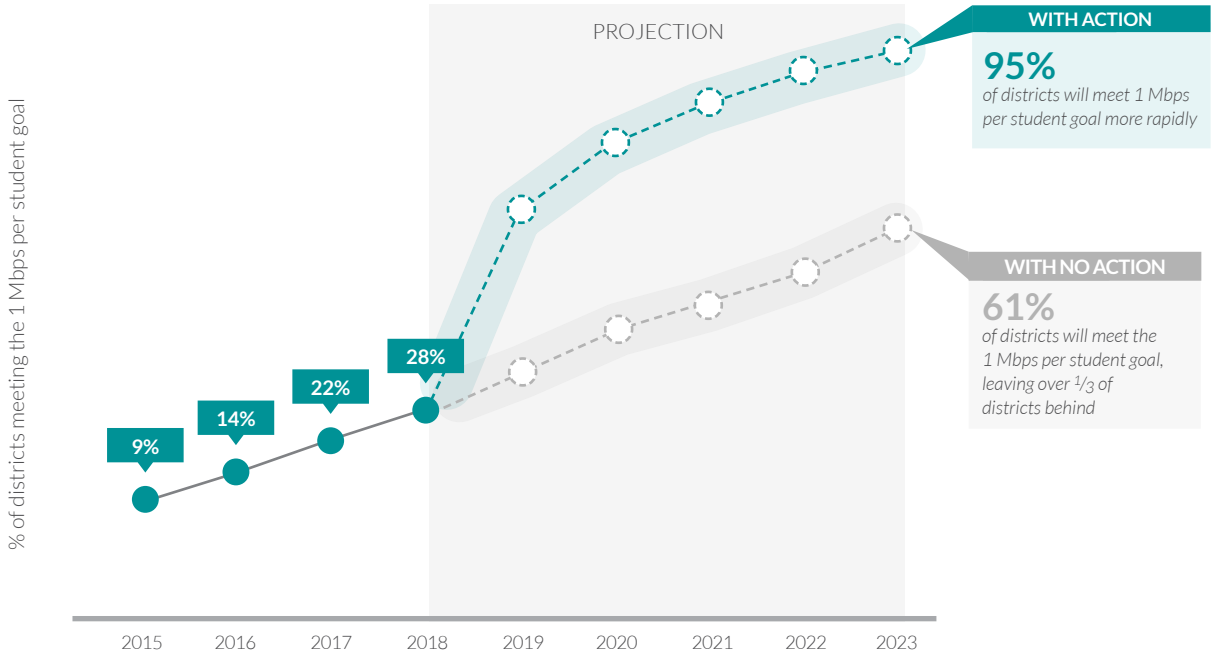
WHY RURAL SINGLE SCHOOL DISTRICTS ARE LEADING THE WAY TO 1 MBPS PER STUDENT

Nearly half (48%) of America's smallest school districts are already meeting the 1 Mbps per student goal. With an average of only 200 students per school and without the resources to offer the same educational opportunities to their students as larger school districts, these communities are aggressively adopting digital learning as a means of leveling the playing field. That's why their district leaders have invested in bringing fiber or other scalable broadband infrastructure to 96% of these overwhelmingly rural school districts. It's also why these districts invest eight times as much in Internet access ($28.70 per student per year vs. $3.49 nationally) and have five times the median bandwidth per student (2.6 Mbps per student vs. 510 kbps per student nationally). These investments open the door to 1:1 student-to-device programs that enable schools to dramatically expand their course offerings, provide access to virtual labs and field trips, and embrace project-based learning, enhancing their students' readiness for college and careers.

It's time to focus on upgrading all of our schools to the FCC's 1 Mbps per student goal

Five years ago, only 30% of America's K-12 public school districts met the FCC's 100 kbps per student Internet access goal. Today, the nation finds itself in a similar place relative to the FCC's 1 Mbps per student goal. In order to allow the promise of digital learning to reach every classroom, every day, we once again need the leadership of governors and other state leaders. By establishing 1 Mbps per student as their state's bandwidth goal, working with service providers to continue to improve the affordability of Internet access, and ensuring districts have access to the information they need to get more bandwidth for their budget, states can once again accelerate the pace of broadband upgrades in their schools.

Chart 13: State action can dramatically accelerate the time it takes to upgrade every school to 1 Mbps per student



In fact, several governors have already provided the leadership needed to help their schools meet the 1 Mbps per student goal. In Arkansas, the state set a goal of bringing 1 Mbps per student of Internet access capacity to every school and delivered this to 98% of their school districts in 2018. In Oklahoma and New Mexico, governors set 1 Mbps per student as their statewide bandwidth target and have made more than twice the progress toward this goal than the average state without a 1 Mbps per student goal. And as students go back to school, we have seen governors in Arkansas, Colorado, Illinois, New Jersey and Montana embrace 1 Mbps per student while 20 others have pointed to the need for schools to keep growing their bandwidth.

24 million students can reach the 1 Mbps per student goal within their school district's current budget

Much like the effort to upgrade America's schools to 100 kbps per student of Internet access, the path to 1 Mbps per student is predominantly about helping school districts take advantage of existing deals that give them dramatically more bandwidth for their budget.

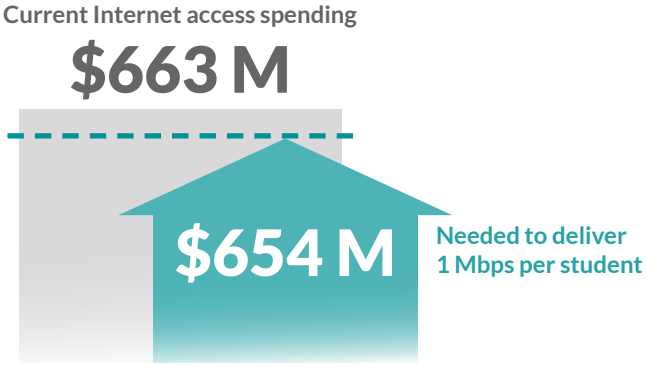
In 74% of school districts, the 1 Mbps per student goal can be reached using their existing Internet access budget by accessing the same pricing as peer districts in their state.[8] On average, we found 32 peer deals for each school district. 35% of these districts don't even have to switch service providers for a peer deal, enabling them to bring digital learning to every classroom, every day, with just a phone call.

If 26% of school districts increase their investment in Internet access, they can reach the 1 Mbps per student goal. On average, they will need to invest an additional $2.61 per student per year, less than the typical annual cost of a single digital learning application.

Continuing improvements in affordability ensure all school districts are capable of reaching the 1 Mbps per student goal

While some school districts need to invest more in Internet access to reach the 1 Mbps per student goal today, improvements in the cost of Internet access are likely to significantly reduce the additional investment required over the next few years. At today's prices, the total cost of providing 1 Mbps per student of Internet access to every K-12 public school student is equal to the total current K-12 investment in Internet access.[9] In reality, even if the rate of cost decline slows significantly from the 35% per year over the last three years, we would expect the total cost to meet 1 Mbps per student nationally to be significantly lower over time.

Chart 14: School districts are already spending enough to deliver 1 Mbps per student of Internet access to every school



DISTRICT STORY

INCREASING BANDWIDTH, NOT CONNECTIVITY COSTS

Ash Grove School District

One of the perennial struggles for rural school districts is to try to offer students the same learning opportunities they might find in a larger district. When the 700-student Ash Grove School District (Missouri) upgraded its bandwidth to the FCC's 1 Mbps per student goal without increasing costs, it was able to roll out a 1:1 program for every student from second through 12th grade. "We wanted to give our students the same opportunities as students in suburban and urban settings, even though we're a rural and small district," said the district superintendent. And thanks to the district's lightning-fast connectivity, now they can.

DISTRICT STORY

SMALL SCHOOL DISTRICT OFFERS STUDENTS BIG POSSIBILITIES

Williamsfield Schools

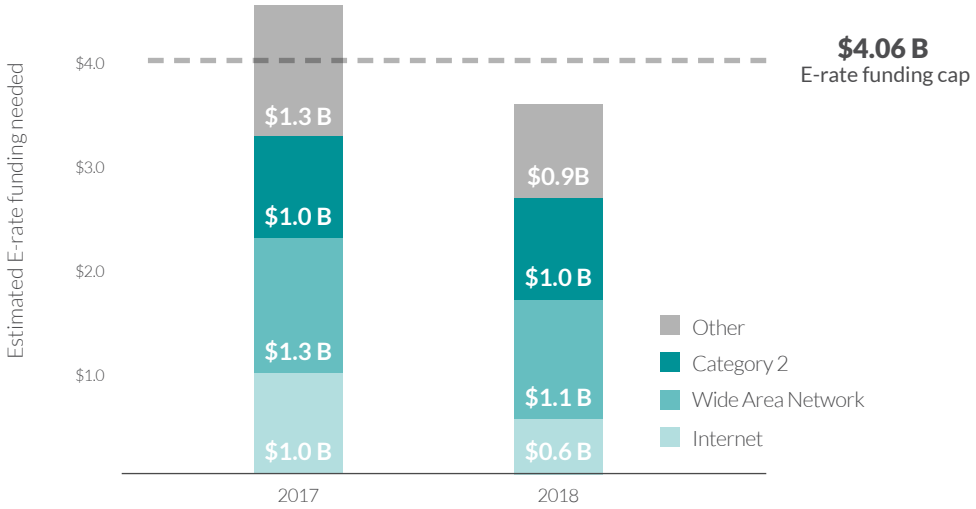
For a rural district superintendent, the decision to stop buying textbooks in favor of spending on technology was a no-brainer. But even he is surprised at all the benefits his 300-student district in the cornfields of central Illinois has seen since the switch. Leaning on a 1 Mbps per student Internet connection, Williamsfield's 1:1 program and use of open educational resources has given its students opportunities usually only available in larger districts. High school students are gaining valuable engineering skills using augmented reality as they learn how to use an $80,000 precision Computer Numeric Control (CNC) tool to create prototypes for their solutions to agriculture challenges. Others are leveraging distance learning to take community college courses without having to spend the time or money to travel 35 miles to campus. "The money we save on transportation and textbooks, the district is now investing into the kids themselves," the superintendent said. This means Williamsfield's graduates can leave with an associate's degree as well as a high school diploma.

Technology is also helping with teacher recruitment. When the district had three teacher openings, it received many more applications than expected. "Recent college graduates want to work in an environment like this; they don't want to go into a classroom with technological restrictions," the superintendent said. The teachers he ended up hiring had multiple offers, but all chose Williamsfield due in part to the district's approach to technology. "That's a byproduct I didn't plan for."

E-rate is ready for 1 Mbps per student

The E-rate program is well positioned to support the need for school districts to grow their bandwidth to the 1 Mbps per student goal. For the first time, the total funding required to meet the 1 Mbps per student goal in districts as well as the funding for Wi-Fi upgrades and the needs of other applicants is less than the funding currently available under the E-rate program cap.

Chart 15: Due to dramatic improvements in affordability, the E-rate program now has sufficient resources to meet the 1 Mbps per student goal



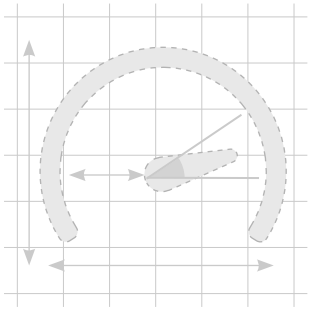
Blueprints for Success

04

Blueprints for Success

A broad coalition of state and federal leaders, service providers, and school district champions have brought high-speed connectivity to an additional 40.7 million students over the past five years. These leaders must now finish the job of connecting the remaining 2.3 million students to high-speed Internet and 1,356 schools to the broadband infrastructure needed for digital learning. They must also provide the leadership required to upgrade our K-12 broadband to the FCC's 1 Mbps per student Internet access goal, so our teachers and students have the opportunity to leverage technology in every classroom, every day.

While every state has been a part of the progress to date, as leaders think about their paths forward, three states have made particularly dramatic progress in upgrading the Internet access, broadband infrastructure, and Wi-Fi in their schools. Arkansas has led the nation to 1 Mbps per student of Internet access in 98% of its school districts. Texas has connected more than 250 schools to fiber in the last three years. And North Carolina has made sure that all of its school districts are getting the most out of E-rate Category 2 funding and are on track to deliver high-speed broadband to every classroom. Here are their stories:



Arkansas becomes national leader in school bandwidth after governor prioritizes upgrades

In 2014, the Arkansas Public School Computer Network (APSCN), once a state-of-the-art K-12 broadband vehicle, had fallen behind the times. The network was still relying on outdated copper technology to provide a majority of its connections to schools, and was only capable of providing an insufficient 5 kbps per student across the state.

Schools in Arkansas that hoped to utilize classroom technology were forced to procure additional services on their own to provide the required bandwidth, while schools that could not afford to buy more on their own were left behind. When Governor Asa Hutchinson took office in 2015, he immediately recognized the need to provide sufficient and equitable access to all of the schools in the state. Governor Hutchinson had campaigned on offering computer science courses to all high school students in the state, a promise that could not be delivered without strong technology infrastructure. Additionally, traditional textbooks were fast becoming outdated as students were being issued tablets and laptops instead of paper materials. To support this changing landscape, Governor Hutchinson directed Arkansas' Department of Information Services and the Arkansas Department of Education to upgrade the APSCN network during his first month in office.

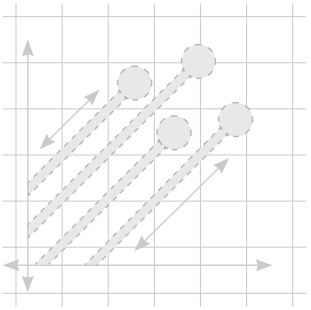
98%

of Arkansas' school districts have Internet connections that can deliver 1 Mbps per student

After giving some consideration to reaching the FCC's short-term goal of 100 kbps per student, **Arkansas decided to be bolder with its intentions: it committed to delivering twice as much bandwidth to every student in the state,** or a 40x increase in the network's previous capabilities. A coalition of 21 service providers in the state answered the call when the network was bid out, and the final outcome exceeded expectations once again: all of the old copper connections were replaced with fiber, and today **98% of Arkansas' school districts have Internet connections that can deliver 1 Mbps per student.** Impressively, this massive expansion of bandwidth capabilities was achieved with only a 7% increase in state funding, while school districts that had

previously been purchasing their own bandwidth outside of the APSCN network no longer needed to incur these costs.

The new APSCN network has allowed schools across the state to move toward 1:1 programs. Educators in Arkansas are now taking advantage of teaching and learning resources in the cloud, which is, in turn, driving more bandwidth utilization on the network, forming a virtuous circle relationship between bandwidth demand and technology adoption. And, of course, thanks to the robust new APSCN network and legislation passed by the state, Governor Hutchinson has made good on his promise to bring computer science education to every high school in Arkansas.



Texas leaders answer governor's call to connect schools to fiber

In the spring of 2016, Texas Governor Greg Abbott, in partnership with the Texas Education Agency and Texas Education Service Centers, launched the Texas Classroom Connectivity Initiative. The goal of the initiative was to ensure that all students have the high-speed broadband needed for a 21st-century education, and one of the barriers to achieving that goal was lack of fiber access. Approximately 300 Texas schools did not have the scalable fiber infrastructure needed to keep up with the growth in bandwidth demand driven by technology integration in the classroom.

As part of E-rate modernization in 2014, the FCC created a new program rule that incentivized states to create matching funds for the one-time construction costs of fiber upgrades. Texas seized the opportunity to address the fiber gap, and in the summer of 2017, the state legislature created the $25 million Texas State Matching Fund to ensure that schools facing connectivity challenges are able to secure the scalable infrastructure needed to support digital learning. The matching fund allowed schools to receive up to 20% more funding than their usual E-rate discount, in some cases eliminating the school district's funding share.

$25 M

State match created to secure scalable infrastructure needed for digital learning

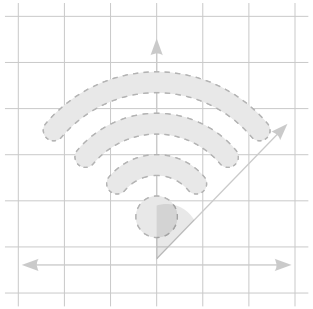
99%

of schools now have fiber connections

> *Learning is no longer limited by bricks and mortar—it is being expanded exponentially by bytes and bandwidth. Texas has made incredible progress connecting our students with high-speed Internet and preparing them to meet future workforce needs, but our work is not yet done. Every child deserves access to quality education, and thanks to technology in the classroom, that opportunity is being made available to all Texas students.*
>
> Texas Governor
> Greg Abbott

To ensure that school districts were aware of the funds and the support provided by the Classroom Connectivity Initiative, Texas engaged a broad coalition of partners within the state to support the efforts. This coalition included the State Board of Education, Texas Computer Education Association, Texas Association of School Administrators, Texas Association of School Boards, Texas Association of School Business Officials, Texas Association of Rural Schools, Texas Rural Education Association, Houston Endowment, E-rate consultants, and service providers. These partners were instrumental in providing outreach to school districts that stood to benefit from the matching fund and in helping to ensure that the schools could navigate the upgrade process.

Due to the efforts of the state and the broad coalition of partners, 99% of Texas schools now have fiber connections. The initiative will continue to support the remaining 50 schools that still need fiber, ensuring they are equipped with robust connectivity so that all students in the state of Texas are able to take advantage of high-quality digital learning opportunities to prepare them for success in the 21st-century.



North Carolina takes a data-driven approach to Wi-Fi network upgrades

When the FCC modernized the federal E-rate program in 2014 and provided every school with a budget to invest in Wi-Fi infrastructure, digital learning advocates in North Carolina saw an opportunity to ensure a robust internal network for every school in the state. To capitalize on this opportunity, they launched a wireless networking initiative that combined matching funds and a data-driven statewide procurement process to drive school district upgrades.

This initiative started by surveying every school in the state on its current and future Wi-Fi needs. Using the survey data, a statewide RFP was designed that asked vendors to propose solutions and pricing for various Wi-Fi network equipment and services. Twelve different contracts were awarded, from which individual schools can choose which vendors and solutions they wish to implement. They also made the decision to upgrade easy for school districts by using state resources to fund the district's share of the $150 per student budget.

Since the program's inception in 2015, every school district in North Carolina participated in the state program, typically receiving services and equipment for 60% less than vendor list prices. To date, $150 million in state and federal dollars have been invested in Wi-Fi networks for North Carolina schools, representing the second-highest utilization of Category 2 funding in the country.

School districts saved

60%

on services and equipment compared to vendor prices

$150 M

in state and federal dollars have been invested in Wi-Fi networks

The State of the States report tracks progress toward the K-12 connectivity goals established by the Federal Communications Commission (FCC)[10] and provides state leaders with the information they need to finish the job of connecting America's students to high-speed broadband. The report, published annually, highlights national and state progress toward achieving connectivity goals and the key requirements for meeting future connectivity needs: access to fiber or equivalent high-speed infrastructure, sufficient Wi-Fi equipment in classrooms to support 1:1 digital learning, and affordable pricing.

States are critical actors in the effort to provide and improve broadband access for K-12 students. School connectivity is often strongest in states where state leadership and state agencies have taken focused action. For that reason, the accompanying website at stateofthestates.educationsuperhighway.org provides insights, broken down by state, to help state leaders see where they stand relative to the FCC connectivity goals, understand potential actions they can take to dramatically improve broadband connectivity in schools, and find out what their state peers are doing.

The analysis in this report is based on application data from the FCC's Schools and Libraries Program ("E-rate").[11] It includes data from 12,336 public school districts, representing more than 46 million students in approximately 83,000 schools across all 50 states and the District of Columbia. Public school district applicants requested $1.9 billion in funding from the E-rate program. All E-rate applications are subject to review before funds are distributed, which ensures that school districts have accurately reflected their requested services. As a result, this data represents the best national source of current information on school district connectivity; specifically, what broadband services schools are buying and how much they are paying for these services.

For the last four years, EducationSuperHighway's team of 25 analysts, data quality specialists, and developers have been verifying and analyzing the 2015-2018 E-rate data. Over this period, the team has placed particular emphasis on clarifying the broadband services contained in E-rate applications by working closely with school districts, state partners, and E-rate consultants to verify that the data accurately represents the services they receive.

Our data verification and analysis efforts supplied us with a comprehensive understanding of connectivity for each school district included in the sample. We then calculated state-level metrics based on a sample of the total school districts in each state, which on average included 96% of districts. As with any sample-based methodology, there is a small margin of error to consider when interpreting state-level results. Regardless, we believe that this report identifies specific actions states can take to improve connectivity in America's K-12 public schools. We will continue to report on our national progress every year to help state leaders close the K-12 digital divide before the end of the decade. For more about our data and metric calculations, please view the full version of the methodology.

A digital version of this report is available at stateofthestates.educationsuperhighway.org. To fully leverage the potential of the open E-rate data, the district-level connectivity and procurement information upon which the analysis of this report is based is available on *Compare & Connect K-12* at www.compareandconnectk12.org, a tool designed to help school districts increase the effectiveness of their network procurement and to help state leaders and service providers identify which school districts need to upgrade their networks.

1 Updated population of teachers per National Center for Education Statistics (NCES) is 2.7 million. Last year, we reported 2.6 million teachers were in districts meeting the 100 kbps per student goal out of a population of 3.1 million teachers.

2 To analyze the potential of price transparency to connect districts to 100 kbps per student of Internet access, we examined the current budget of each school district not meeting the 100 kbps per student goal and looked to see if any of its peer districts were purchasing Internet access at prices that could meet the 100 kbps per student goal within the district's current budget. In this report, we refer to these as "peer deals."

3 Alaska has 147 schools that lack scalable broadband infrastructure. Given the state's size and the difficulty of fiber or fixed wireless construction, none of these schools have affordable upgrade options. In order to connect these schools to digital learning, the FCC should work in partnership with the state to develop a specific technical and funding strategy that will deliver the broadband infrastructure Alaska's students need in the most cost-effective manner for the E-rate program. For this reason, we have excluded Alaska from our funding calculations and limit that analysis to the 1,209 schools in the continental United States. All of Hawaii's schools are already connected to fiber.

4 In 23 states, any school with an 80% or greater E-rate discount level will have the entire upfront cost of its fiber upgrade covered by E-rate and its state matching fund. In four states (Arizona, Illinois, Missouri, and Washington) the state matching fund covers the school district's entire upfront construction costs regardless of the school's E-rate discount rate.

5 This figure includes $2 million in contingency funding in the event costs are incurred for builds when fiber is available on the block.

6 As of October 1, only 17 of these applications had received funding decisions.

7 E-rate rules allow school districts five years to use their Category 2 funds from the time that any school in a given school district uses their first funds. However, the Category 2 program established by E-rate modernization is only in effect until the end of the current E-rate cycle. School districts that fail to apply for any of their Category 2 funds prior to April 2019 will not be able to access funding available under the current five-year program.

8 For the largest school districts, where no peers are available, we used the median national price of the circuit size they need to reach 1 Mbps per student goal.

9 For today's prices, we use the $1.16 cost per Mbps being paid by school districts currently meeting the 1 Mbps per student goal.

10 See FCC Report and Order and Further Notice of Proposed Rulemaking, WC Docket 13-184, released July 23, 2014, ¶ 22-62, https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-99A1.pdf

11 The Schools and Libraries Universal Service Support Program, commonly known as the E-rate program, helps schools and libraries obtain affordable broadband. Eligible schools, school districts, and libraries may apply individually or as part of a consortium. Funding may be requested under two categories of service: Category One services to a school or library (telecommunications, telecommunications services, and Internet access), and Category Two services that deliver Internet access within schools and libraries (internal connections, basic maintenance of internal connections, and managed internal broadband services). Discounts for support depend on the level of poverty and whether the school or library is located in an urban or rural area. The discounts range from 20 percent to 90 percent of the costs of eligible services. E-rate program funding is based on demand up to an annual Commission-established cap of $4.06 billion. See FCC, E-rate, https://www.fcc.gov/encyclopedia/e-rate-schools-libraries-usf-program

About EducationSuperHighway

EducationSuperHighway is the leading non-profit focused on upgrading the Internet access in every public school classroom in America. We believe that digital learning has the potential to provide all students with equal access to educational opportunity and that every school requires high-speed broadband to make that opportunity a reality.

Our work focuses on catalyzing federal and state action on K-12 broadband initiatives and accelerating upgrades in school districts by connecting them to competitive service provider options. We are currently working with governors in 22 states covering 24 million students and providing technical and procurement support to hundreds of school districts. Our *Compare & Connect K-12* online tool helps schools, state leaders, and service providers view broadband services and bandwidth information for school districts nationwide so they can get and deliver more bandwidth for their broadband budgets. As a non-profit, our tools and services are offered free of charge.

EducationSuperHighway is funded by national philanthropic organizations, including the Chan Zuckerberg Initiative and the Bill and Melinda Gates Foundation, and our mission is supported by 49 U.S. governors and America's leading CEOs.