Building Fiber to Schools

Here's a good-news story: The drive to provide high-quality internet service to U.S. schools has made tremendous progress, and the goal of universal connectivity is within sight.

By Masha Zager / *Broadband Communities*

Over the last four years, U.S. schools have made great advances in connectivity, enabling students to take advantage of digital learning. According to a new report by EducationSuperHighway, a nonprofit dedicated to helping schools close the digital divide, more than 35.2 million students gained access to the broadband they need for digital learning between 2013 and 2017. Ninety-seven percent of schools are now connected by fiber, and 88 percent have sufficient Wi-Fi in their classrooms.

This rapid progress was made possible by the FCC's 2014 changes to E-Rate, a Universal Service Fund program that subsidizes connectivity for many schools and libraries. The FCC provided additional E-Rate funding and gave school districts more flexibility to get the connectivity they need. In addition, schools were able to take advantage of falling bandwidth prices.

The other side of the story is that work still remains to be done. As many as 6.5 million students still do not have sufficient connectivity, more than 2,000 schools still need to be connected to fiber and about 10,000 schools still need Wi-Fi. But EducationSuperHighway has strategies for reaching the goal of universal connectivity, and Evan Marwell, the organization's founder and CEO, says, "I have a lot of confidence that we'll get awfully close by 2020."

NEGOTIATING BETTER DEALS

For 6 million of the 6.5 million students, gaining sufficient connectivity is a matter of negotiating more favorable prices with service providers. Because E-Rate has a "lowest corresponding price rule" that obligates providers to bid the lowest price they offer other similarly situated E-Rate customers, schools should theoretically be able to get the same prices as their peers. However, many schools are overcharged because they don't know what other E-Rate customers pay.

EducationSuperHighway's strategy is to increase transparency by tracking and publishing the prices schools pay for connectivity. (In addition, the Universal Service Administrative Company (USAC), which administers E-Rate, recently launched an online tool to help state and district leaders leverage price transparency.) "When schools have the data, it changes the balance of power," Marwell explains. Most broadband contracts are for three-year terms, and as they come up for rebidding, school districts can often demand the same pricing available to similarly placed districts in their states. More than half of this group would not even have to switch service providers.

For example, Paul Puzzanghera, tech director for Andover Town & Schools in Massachusetts, uses EducationSuperHighway's
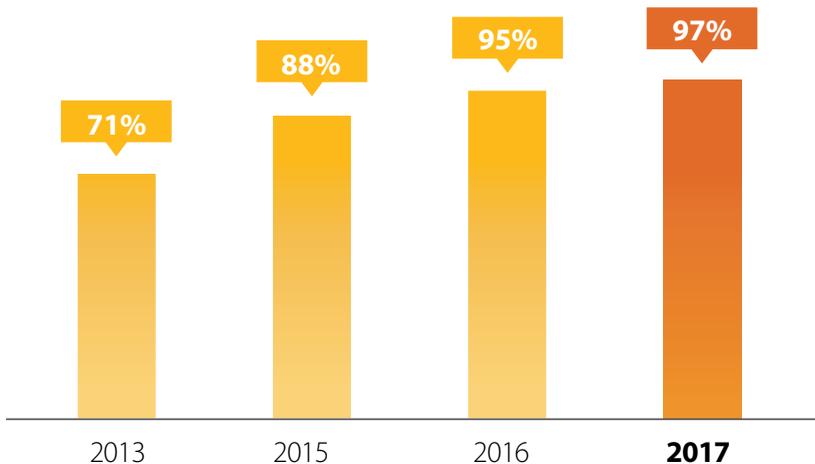
When schools have data on broadband prices, it changes the balance of power.
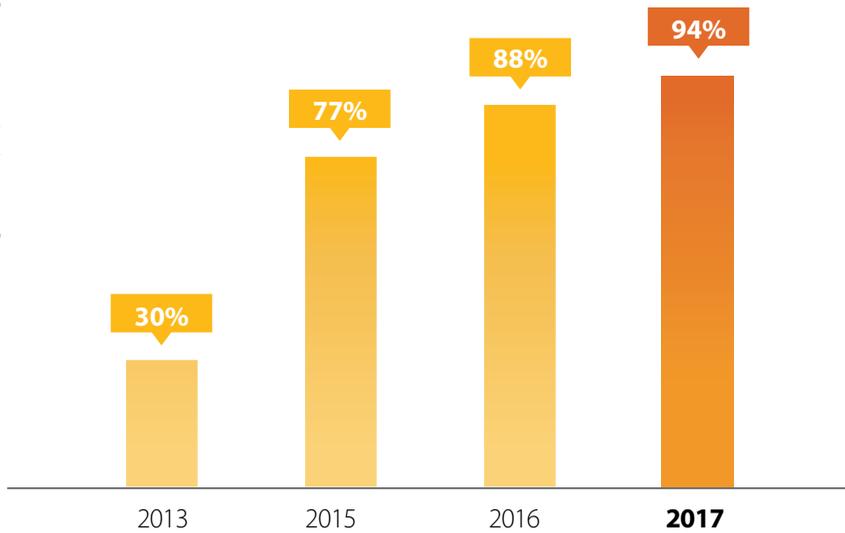
Ninety-four percent of school districts are now ready for digital learning.

Ninety-seven percent of schools have the fiber optic connections they require to meet current and future connectivity needs.
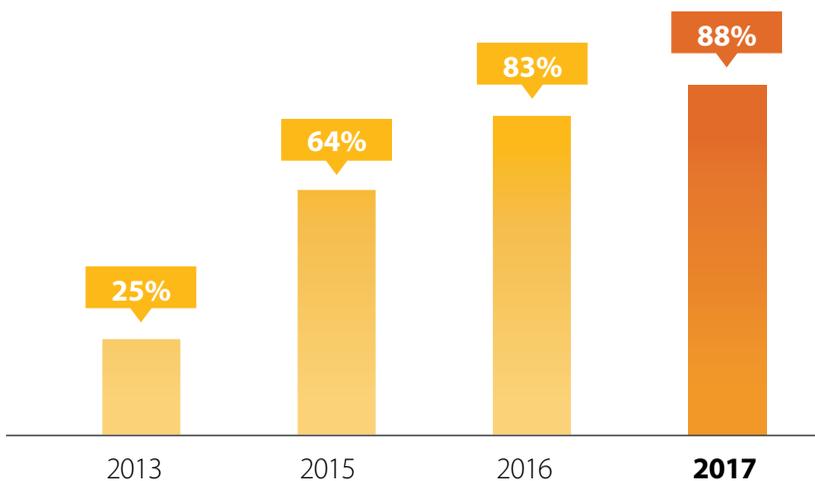
Eighty-eight percent of schools report having sufficient Wi-Fi in their classrooms.

price transparency tools to assess how much bandwidth his district is getting for its budget in comparison with nearby districts. He discovered that although Andover's negotiated contract price was within the normal range, the district lagged behind in its bandwidth per student. In his E-Rate bid for 2017, he requested double the bandwidth to ensure that his district received the most value possible to meet current and future digital learning needs.
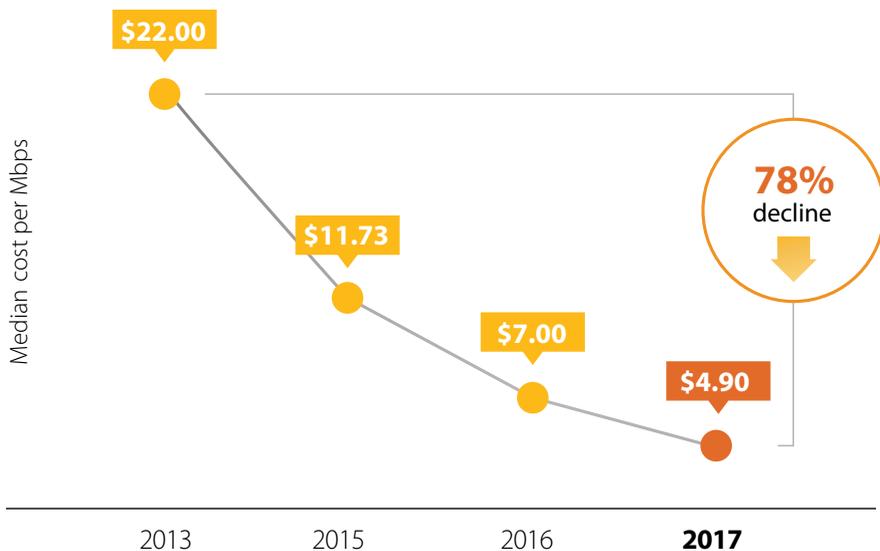
Waiting for the contract expiration date isn't always necessary. Marwell says, "We've seen lots of examples where, even in mid-contract, the school district calls up the provider and says, 'What the heck?' It works because of the economics of broadband – it's free for service providers to give them more broadband. The service provider wants to retain the revenue, and the school districts don't mind paying what they're paying; they just want more bandwidth for it."
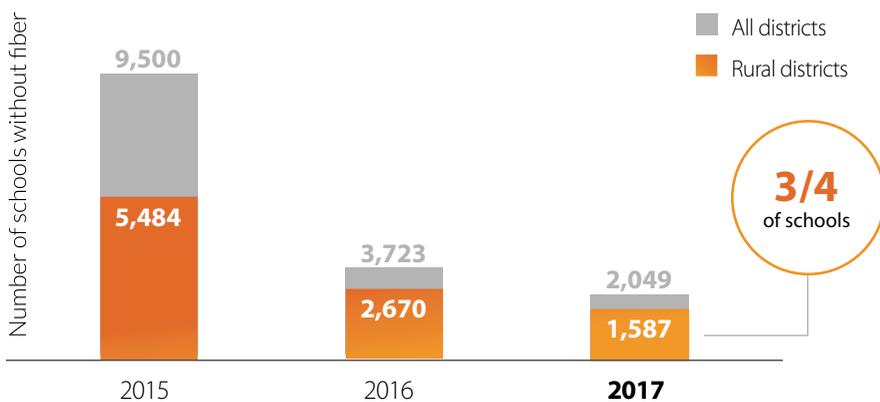
INCREASING COMPETITION
Broadband prices can also be reduced by increasing competition. Not long ago, many schools had difficulty getting *any* bids on E-Rate contracts, let alone competitive bids. In most cases, the only potential service provider was the local incumbent telco. The situation has improved in recent years. Several national fiber operators, such as Zayo and Level 3, have entered the E-Rate market on a broad scale, Marwell notes, as have regional players in some parts of the United States. Some schools are connecting to statewide research and education networks.

In 2014, the FCC began allowing schools to self-provision fiber – that is, build and operate their own connections – if that is the most cost-effective solution. Not many schools have tried to self-provision, and the FCC is often reluctant to approve their requests, but it has been done in a few cases, and the threat of self-provisioning puts some competitive pressure on prices.

EducationSuperHighway lists all the providers doing E-Rate business in each state on its website so schools

$22.00

$11.73

$7.00

$4.90

78% decline

Median cost per Mbps

2013   2015   2016   **2017**

The cost of K–12 internet access has declined 78 percent in the last four years.

9,500

5,484

3,723

2,670

2,049

1,587

3/4 of schools

Number of schools without fiber

All districts
Rural districts

2015   2016   **2017**

Rural and small-town schools represent three-quarters of the schools without fiber.

districts need to invest an average of an additional $1.07 per student per year.

Often, budgets are too low because districts don't know how much bandwidth they need; many don't understand that they haven't allocated an appropriate amount of funds. "We need to work with them to get more budget," Marwell explains. "It's an education challenge."

KEEPING UP WITH BANDWIDTH NEEDS

The FCC set a short-term connectivity goal for schools of 100 Kbps per student, which is sufficient for access to online testing and text-based digital learning. However, as online learning becomes increasingly media-rich – audio, video and even mixed-reality features have become common – many schools recognize the need to keep upgrading bandwidth. In districts that meet the minimum connectivity goal, the median bandwidth per student is now 411 Kbps, a 29 percent increase over 2016. More than one in five school districts now meets the FCC's long-term goal of 1 Mbps per student.

Eventually, even 1 Mbps per student won't be enough; like households and businesses, schools will continue to demand more bandwidth for the foreseeable future. Marwell comments, "Five years ago, people didn't know what to do with technology in the classroom – they were just automating what they were already doing. Now they're changing the pedagogy. … A ton more will happen over time." Nationwide, teachers and principals share their tech success stories and learn from one another, Marwell says.

To continue upgrading their bandwidth, all schools need direct fiber connections to the internet. But connecting the remaining 2,000 schools will not be easy. About 77 percent of them are in rural areas, far from any fiber trunks. In many cases, there are not enough other potential fiber customers nearby to make an economic case for a service provider. "Often these schools will put out bids, and no one will respond," Marwell says. "Only about a third of them got anyone to bid."

can find out where to send invitations to bid. "This is where school districts struggle most," Marwell says. "They don't know who to call." In addition, EducationSuperHighway has contracts with nearly 30 states to inform service providers about upcoming bids in those states and persuade them to bid.

CONNECTING THE LAST HALF MILLION

About 100,000 of the 6.5 million students live in school districts that receive favorable pricing but are located in areas where bandwidth is more expensive than the national average. For those districts, time is on their side. Most could pay for sufficient

broadband with their current budgets if bandwidth costs fell by 10 percent – "and that's less than we've seen each year," Marwell says. Median bandwidth costs for schools have fallen by 78 percent over the last four years.

Finally, about 400,000 students live in districts that simply have not allocated enough funds for broadband. On average, these districts spend 90 percent less per student on internet access than districts that meet the minimum connectivity goal. Surprisingly, they are not necessarily the poorest districts – in fact, they have slightly fewer financial constraints than their better-connected peers. To meet the minimum connectivity goal, these

As mentioned above, schools can, in theory, use E-Rate funds to build their own fiber connections. However, in addition to the difficulty of getting such requests approved, few rural schools have the resources to pay for their share of such connections. Thus, getting fiber to 100 percent of schools remains an elusive goal.

DEPLOYING WI-FI

One of the FCC's most important E-Rate initiatives was to help schools outfit their classrooms with Wi-Fi. Eighty-eight percent of schools now have Wi-Fi in every classroom.

Deploying Wi-Fi in the last 12 percent of schools is in some ways easier than getting fiber to the last 3 percent. There is still funding to cover Wi-Fi, and many of the remaining schools have some Wi-Fi and plan to install more as it's needed or as they can budget the funds for their own share.

In addition, a few states have programs to pay some of the matching funds.

In some cases, Marwell says, schools either don't know they're eligible for Wi-Fi funding – which for many years was restricted to only a few of the poorest districts – or don't have the technical expertise to specify the right equipment. EducationSuperHighway is helping districts with both these educational missions.

ADDRESSING ACTION ITEMS

EducationSuperHighway recommends a wide range of action items for all parties interested in making sure students can access digital learning resources. A few items are most critical.

- State governments should set up fiber matching funds if they haven't done so already. "Nothing will be more impactful," Marwell says.
- Service providers should take advantage of E-Rate to build out

their networks, especially where they have no fiber today.
- School districts should use tools from USAC and EducationSuperHighway to learn more about what their peers are doing and improve their procurement practices.
- The FCC should improve the administration of E-Rate to make it work better for applicants, especially those that want to self-provision with fiber. "They should be rolling out the red carpet, not the red tape," Marwell says.
- Finally, EducationSuperHighway should (and plans to) convince additional providers that E-Rate can be a good business for them. ❖

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