



EDUCATION AT THE SPEED OF FIBER

Across the U.S., cable companies are helping educators modernize the digital learning experience – megabit-by-megabit

When educators in the state of Washington drew up plans for an ambitious, statewide educational telecommunications network, they weren't entirely sure how to transform their vision into reality. That's because the objective seemed slightly audacious: connect nearly 500 Washington schools, academic institutions and libraries with a high-capacity, always-available network that could do it all -- everything from delivering live, high-definition lectures to students in remote classrooms to transferring massive amounts of digital files with failsafe security and identity protection.

Where to look to complete the vision? It turns out the ideal provider was right in the state's own backyard.

The Washington Education Network, regarded as a model for connected education in the 21st Century, was built and is maintained by the same company that had first made its name in the cable television business throughout much of the state. After a rigorous evaluation process, technology advisors for the Washington consortium selected a unit of Comcast as the main provider for the 500-site network.

"As the largest education network in the State of Washington, we need to be able to connect thousands of students, multiple schools and several organizations together," said Mike Scroggins, chair of the K-20 Network Consortium, in announcing the selection. "K-20 counts on Comcast Business to provide the performance, scalability and support we need to run the network effectively."

The December 2015 announcement of Comcast Business's selection reflected the cable industry's emergence as a prominent new player in the nation's connected education sector. Dovetailing with a renewed nationwide emphasis on digital connectivity as a key enabling ingredient for schools and their students, the cable industry has launched a concerted coast-to-coast initiative to lead the modernization of the U.S. educational infrastructure.



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Washington's K-20 network is one example of how cable's making its mark in the education marketplace. By helping the founders achieve their goal of becoming "the nation's first high speed, high-capacity network linking colleges, universities, school districts and libraries statewide," Comcast provides a fiber diverse, hub-and-spoke Ethernet Virtual Private Line configuration that links 101 remote K-20 spoke locations back to the organization's main data center.

The configuration is emblematic of what cable can do to help schools achieve their vision for connectivity. As the owners/operators of their own networks, cable companies have the unusual latitude to custom-engineer, provision and maintain fiber-based networks that supply dedicated, secure bandwidth to large enterprises, government offices and educational institutions.

In many cases, cable companies already have fiber networks in place alongside school buildings and campuses. In cases where buildings are located off-network, cable companies can extend their existing networks or, in some cases, partner with other providers to ensure the buildings are connected.



For example, in 2017, Altice USA the cable provider that operates across 21 states including in the New York tri-state area, was able to connect 47 additional schools to an existing all-fiber network that already connected close to 60 school locations in New Jersey. The deployment, part of the New Jersey Department of Education's Digital Readiness for Learning and Assessment Project, has given schools like Bergen County Academies (a nationally recognized public high school in Hackensack), powerful new in-classroom multimedia resources to enhance educational experiences. Beyond that, the

deployment supports a range of data and communications needs for an increasingly digital education environment. John Cottage, system administrator for Bergen County Technical Schools, said schools have been able to "significantly improve network speed and reliability, all within budget," thanks to the Digital Readiness/Altice Business expansion.

CLOSING THE CONNECTIVITY GAP

In New Jersey, Washington and elsewhere, school districts are engaging cable companies to help modernize their data, video and voice networks in accordance with a 2014 FCC objective, calling for a near-term goal of 100 megabits per second of downstream bandwidth for every 1,000 students, and a longer-term goal of 1 gigabit per second for the same number of students. In 2014, the FCC made resources available to close the connectivity gap by increasing its investment in K-12 broadband by \$2.5 billion to a total of \$3.9 billion annually through the agency's Universal Service Program for Schools and Libraries, commonly known as "E-rate."

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In alignment with the federal objective, most large U.S. cable companies have created specialized Education units that are devoted to helping schools and districts design and implement high-capacity fiber networks. Many of them are staffed by former educators who are familiar with the ins and outs of securing federal subsidies drawn from the FCC-administered E-Rate program.

The dedicated focus on the education sector has given rise to platforms and services tailored specifically for schools. The Atlanta-based cable company Cox

Communications, has designed a self-healing, fault-tolerant network architecture that's optimized to support a central media access network giving educators on-demand access to photographs, videos, graphics and live applications for use in instruction. For teachers, that's a big improvement from running to the library to fetch physical media requiring a dedicated playback device.

Other cable companies have drawn up similar customized network architectures to solve some of the specific needs and connectivity plans of school districts. In Texas, the five-campus Wylie School District has adopted a "bring your own device" approach that invites students to use their own laptops, tablets and smartphones within the classroom to access web-based learning applications. With a limited procurement budget to help outfit K-12 students who don't have their own devices, Wylie required that the data network supporting the plan meet stringent performance conditions – at an affordable cost.



That's where Spectrum Enterprise came in. The local cable company, drawing on its experience as an E-rate eligible telecommunications provider, drew up plans to provide an upgraded, 1 Gbps fiber access network that lets teachers leverage cloud-based resources like Google Apps for Education to enrich the learning experience. Replacing a previous 50 Mbps circuit, the new Spectrum Enterprise network delivers symmetrical connectivity, providing private, redundant connectivity with a future-proofed upgrade path the district already has utilized as its usage has climbed.

This example points to an essential reality of the new K-12 communications era. One major driver of rising bandwidth appetite – just ask any high-school teacher trying to command attention from the class – is the proliferation of digital devices among the student population.

DEVICES EVERYWHERE

In 2014, if you asked U.S. school district administrators why they needed more oomph in their telecommunications

infrastructure, you'd hear a common answer: online testing. As schools geared up to meet specifications tied to the [Common Core State Standard](#), many found they lacked the networking muscle they needed to match soaring demand for secure digital file transmission. Now, the emphasis has changed. The explosive growth in student digital devices – and the bandwidth they demand – is cited today as the No.1 driver for bandwidth expansion, according to the Consortium for School Networking, a Washington D.C.-based research and advocacy organization. Its [2017 Annual Infrastructure Survey Report](#) identifies shows student devices have overtaken online assessments and even digital content delivery as the biggest instigator for more, better networking capabilities. With more students owning devices every year and with more bandwidth-hungry applications being downloaded onto devices, the trend seems certain to continue.

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In addition, the recognition that connectivity within schools is a critical ingredient for U.S. competitiveness at large. Research published by [EducationSuperhighway](#), the national non-profit organization dedicated to modernizing school connectivity, found that as of 2017 roughly 6.5 million students (in rural and urban settings alike) attended K-12 schools that weren't meeting the 100 kbps per student connectivity goal for digital learning. The gap isn't merely the consequence of funding availability. EducationSuperhighway reported there was still more than \$2 billion remaining in E-rate funding for school broadband as of late 2017, with the pool of funds set to sunset in 2020.

On the positive side, the organization points out the U.S. has made enormous strides in modernizing school broadband: More than 39 million students, 2.6 million teachers and 74,000 schools have been connected. Eighty-eight percent of schools report having sufficient Wi-Fi in their classrooms. And nine states have achieved 100% connectivity to 21st Century broadband networks.

Not that the K-12 community, and the cable companies that are serving it, are standing still. Even school district CTOs whose operations already meet the E-rate standard must remain ever-mindful of “future-proofing” their networks to accommodate on-the-fly expansions. In the case of Washington's K-20 Network, for example, two 100 gigabit fiber circuits supply over 200 Gbps of data throughput, which gives it the ability to grow as future network demands increase.



That sort of expansion capability is important as new digital applications arise. In the Quad Cities region of Iowa, for example, Buffalo Elementary School has introduced virtual-reality technology that immerses students in life-like learning experiences around subjects ranging from the solar system to water quality. Bandwidth for the high-demand VR medium comes from cable company Mediacom Communications through its new Gigabit+ fiber network initiative.

As they work with educators to revolutionize the way learning happens, cable companies also are mindful of the impact of high-speed connectivity beyond the classroom. Recognizing homework assignments, test scores and research projects increasingly depend on high-speed Internet

access at home, numerous cable companies have made low-cost Internet access services available to low-income families with children who qualify for the National School Lunch Program. [NCTA --The TV & Internet Association](#), an industry trade organization, reports that 750,000 U.S. families have been connected through cable broadband adoption programs like Connect2Compete and Comcast Internet Essentials, which have been offered in association with more than 55,000 schools.

These affordable student-broadband programs are part of a broader effort that's aligned with the mission expressed by EducationSuperhighway's founder, Evan Marwell. "Success is within reach," Marwell wrote recently in summarizing 2017 statistics around the rising capabilities of digital networks for U.S. students. "Let's make that final push toward digital equality in every school, for every child." With cable's help, the goal is within reach.



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