

State K-12 Broadband Leadership 2019: Driving Connectivity, Access and Student Success

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SETDA
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SETDA Founded in 2001, the **State Educational Technology Directors Association (SETDA)** is the principal nonprofit membership association representing US state and territorial educational technology leaders. Our mission is to build and increase the capacity of state and national leaders to improve education through technology policy and practice. For more information, please visit: setda.org.

REPORT AUTHORS

Christine Fox, Deputy Executive Director, SETDA

Rachel Jones, Educational Consultant

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BACKGROUND

SETDA and its state member leaders play a pivotal role in driving high-speed broadband access to all students to best prepare them for college and careers. Complementing the 2016 [State K-12 Broadband Leadership: Driving Connectivity and Access](#), this publication highlights the importance of state leadership and the various ways states strive to support districts and schools. Students deserve these equitable opportunities both on and off campus. States demonstrate leadership through legislation, initiatives, partnerships, statewide broadband networks, regional networks, and/or statewide purchasing consortia to facilitate reliable, cost-effective internet access for districts. States are also developing strategies to help ensure all students have adequate internet access both on and off campus, whether it is publicizing affordable home internet options; the availability of free internet at community locations; or the ability to provide Wi-Fi on school buses. With state leadership to ensure connectivity and access, districts and schools can achieve their goals for digital learning for all students. No one state has the same policies or practices, yet all states are providing leadership. In addition to this report, SETDA published an [Online Broadband Map](#) tool to highlight individual state policies and practices and to share additional state examples.



CASE STUDIES

This publication includes a more in-depth look at how three states are ensuring reliable, cost effective connectivity for their districts and schools. Learn about leadership practices at Connecticut, Kentucky and Minnesota for both on and off campus connectivity. These states share unique stories around implementation, including examples showcasing how connectivity changes teaching and learning.

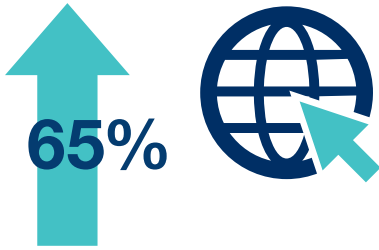


STATE K-12 EDUCATION ONLINE BROADBAND MAP

Educators, policy makers and private sector executives have the opportunity to learn about state leadership and practices for broadband and wireless connections, as well as off campus access strategies. The [State K-12 Education Online Broadband Map](#) will identify which states have statewide networks, regional networks and statewide purchasing consortia.

QUICK FACTS

The updated [2017 National Education Technology Plan](#) addresses K-12 infrastructure and identifies ubiquitous connectivity as one of four essential components necessary to support learning. As evidenced in the [Every Student Succeeds Act \(ESSA\)](#), there is an increased emphasis on digital learning, which requires access to high-speed broadband. Designing high-capacity and widely available networks, including the utilization of wireless networks is essential for meeting digital learning goals. Bandwidth capacity determines which digital instructional materials and educational applications students and educators can effectively leverage in the classroom. Off campus access for educators and students is also essential for ensuring equitable access to digital tools and resources for all students.



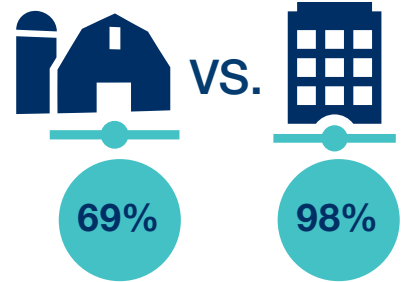
Future Internet Growth Rate

[Education Networks of America \(ENA\)](#), based on its experience delivering connectivity to over 7,000 schools and libraries, continues to observe and projects into the future a bandwidth growth rate of 65% per year.



Top Drivers for Increased Bandwidth in Schools

[CoSN's 2018-19 Annual Infrastructure Report](#) states that student devices and digital content continue to rank as the top drivers for increased bandwidth in schools.



Regional Broadband Speed Comparisons

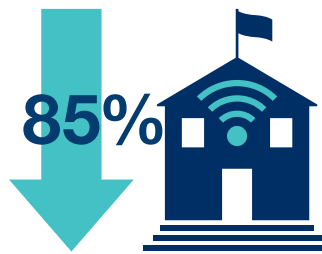
[FCC 2018 Broadband Deployment Report](#) reveals that only 69% of citizens in rural areas have access to both broadband (25 Mbps/3 Mbps) and mobile services (LTE at speeds of 5 Mbps/1 Mbps) compared to 98% of citizens in urban areas.



Primary Barrier to Internet Access

[Institute of Education Sciences \(IES\) Student Access to Digital Learning Resources Outside the Classroom](#) report states that the primary barrier to internet access

at home is affordability, especially for children from low-income families.

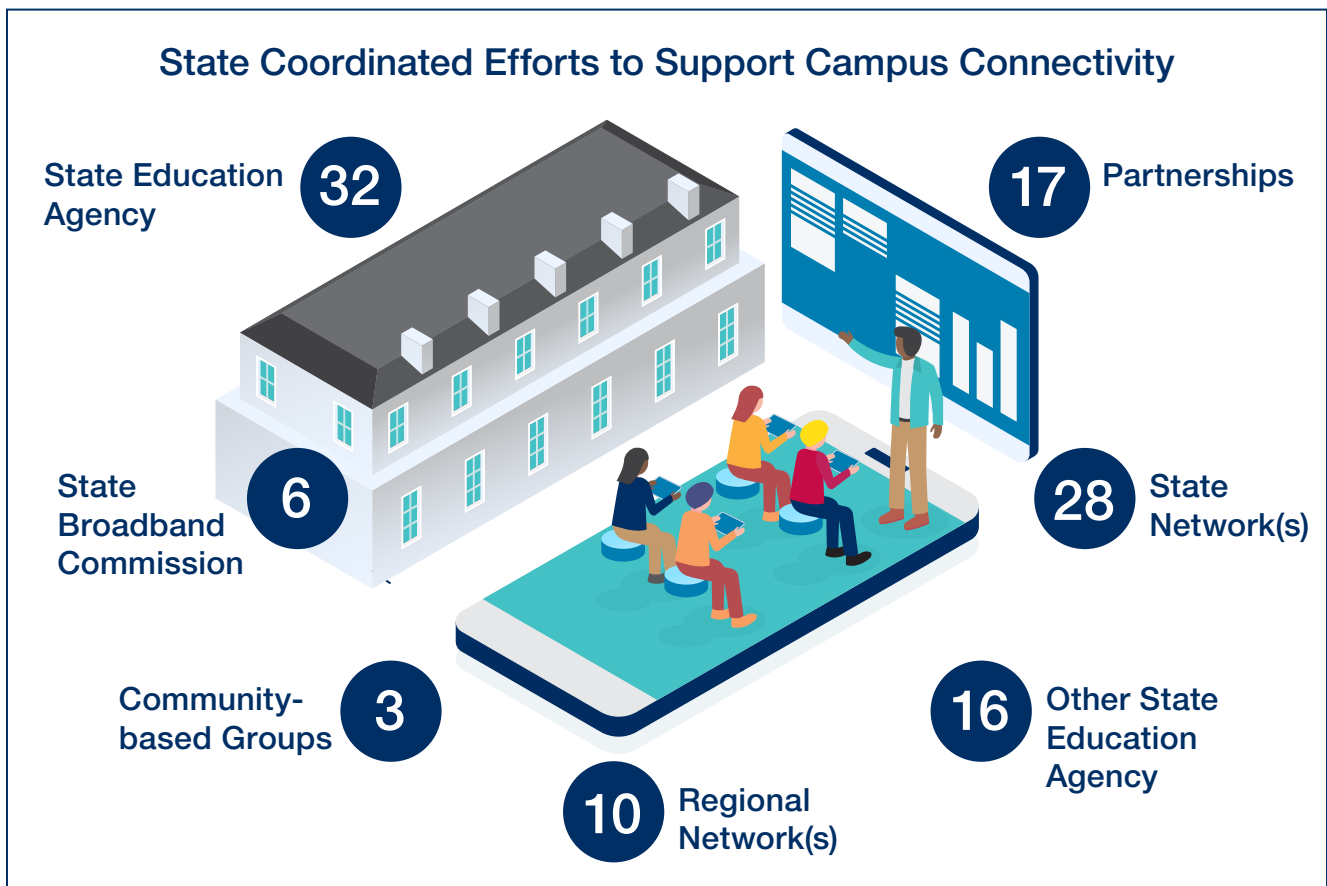


Cost of School Broadband

[EducationSuperHighway](#) reports that since 2013, the cost of school broadband has decreased by 85%.

STATE LEADERSHIP PRACTICES

State leadership is essential if we are to meet our goals for digital learning for all students in and out of the classroom. State K-12 education broadband leadership varies among and across states to ensure that school districts have access to scalable infrastructure, ample bandwidth capacity and ubiquitous Wi-Fi for learning opportunities. No two states are exactly alike as multiple considerations including geography, state education agency practices and state procurement laws all impact decisions regarding broadband support and implementation. Some states have implemented a statewide network, while some states solicit different state agencies to collaborate with each other *and* partner with non-profit organizations. Other states collaborate with various state agencies, regional organizations, community-based groups, or external organizations. Sometimes the state legislature plays an instrumental role in spear-heading expanded access for schools. In other states, infrastructure programs include provisions to ensure classrooms have updated and reliable Wi-Fi. Whether states partner with internal state agencies, external organizations, or some other combination, the overall goal is to expand high-quality connectivity to all K-12 public schools to provide robust access for students to further teaching and learning.



*States indicated the types of efforts to support on campus connectivity. For details regarding each state visit the [State K-12 Education Online Broadband Map](#).

State Leadership Examples



Arkansas: A top priority for the Governor, the Arkansas Department of Education, and the Arkansas

Department of Information Systems (DIS) is to ensure that the state's K-12 public schools have sufficient high-speed broadband services to support online testing and digital learning. This priority was realized in July 2017 when 100 percent of the state's K-12 school districts were connected to high speed broadband through the [Arkansas Public School Computer Network \(APSCN\)](#). With this accomplishment, Arkansas went from being at the bottom of the nation in K-12 internet connectivity to the top as a national role model and one of only a handful of states to achieve broadband connectivity to 100 percent of its K-12 schools. Arkansas doubled the SETDA/FCC internet access target of 100 Kbps/student to reach 200 Kbps/student of highly secure, E-rate eligible, state funded, broadband connectivity.



Connecticut: The [Connecticut Commission for Educational Technology](#)

(Commission), created in 2000, serves as the educational technology advisor to schools, libraries and institutions of higher education and started with a mission to connect public schools and libraries to the internet. The Commission created and oversees the [Connecticut Education Network \(CEN\)](#), the first among — and one of only a few — state networks in the country to connect every district to fiber. CEN connects virtually every institution of higher education as well as 62% of libraries in the state, in addition to serving as the primary public resource in K-12 broadband provision and support in the state. CEN is a member of Internet2 and The Quilt, both of which help with policy and advocacy for K-12 and other anchor institutions.

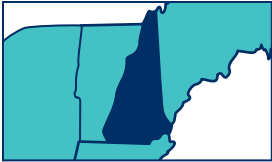
“ Both the Commission and the CEN greatly enhance the education of our students through forward thinking on critical technology issues and through the provision of cost effective and cutting edge capabilities. ”

**—Mark Raymond, Connecticut State CIO and Chair,
Connecticut Commission for Educational Technology**



Kentucky: The 1990 [Kentucky Education Reform Act \(KERA\)](#) created the Kentucky Education Technology System (KETS) authorizing the Office of Education Technology (OET) within the Kentucky Department of Education (KDE)

to provide internet access to all school districts. One of the key components included in the legislation was the development of a technology masterplan, typically covering 6 years. The Master Plan for Education Technology guides decisions about network infrastructure and future bandwidth needs.



New Hampshire: The [New Hampshire School Connectivity Initiative \(NHSCI\)](#) represents a collaboration between state agencies and organizations involved with and interested in expanding connectivity and broadband services to enhance high-speed broadband access for K-12 public schools and students throughout the state. The initiative formally defined its goals as: 1) compile a comprehensive K-12 broadband connectivity report based on analysis and reporting of data collected; 2) develop a plan to meet K-12 connectivity goals through the facilitation of statewide K-12 fiber network discussions with school districts, service providers, and partner organizations; and 3) create strategies to enhance the utilization of E-rate funds that are used to provide discounted broadband services to schools and libraries across the state.



Oklahoma: The Governor's office developed the [Connect and Learn Initiative](#) to focus on getting fiber to all schools to transform education. By building out the core infrastructure to school districts, students have the opportunity to access digital learning opportunities to prepare them with the skills they need for the future. Partners working on this initiative include the state education agency (OSDE), the state IT agency (OMES), state corporation commission (OCC) and EducationSuperHighway (ESH).



Virginia: The Virginia Department of Education (VDOE) established the [K-12 Learning Infrastructure](#)

[Program \(KLIP\) in 2015](#) with four primary goals:

Bring fiber to schools that need it; ensure classrooms have updated and reliable Wi-Fi; help divisions secure more broadband for their budgets and assist schools with the E-rate process to get the discounts they need for internet access and internal connections. VDOE also established the KLIP Work Group to assist the department with issues and innovation in network infrastructure and broadband technologies.

The VDOE in partnership with the Virginia Society for Technology in Education (VSTE) plans an annual *Leading Ed Forum* for school division technology leaders. The VDOE also administers a required General Assembly Broadband Connectivity Capability Survey (BCCS) to identify areas of infrastructure and broadband needs in Virginia's public school system.



STATEWIDE K-12 EDUCATION BROADBAND CONNECTIVITY

Statewide broadband networks can provide significant benefits to districts, including cost savings and increased bandwidth options. Statewide purchasing consortia, statewide purchasing contracts, regional networks, regional purchasing consortia and district consortia are other approaches for providing efficient and economical broadband connectivity to schools. However, not all districts have access to a statewide network or statewide or regional consortia or master contract options. Instead these districts purchase network services through a commercial or nonprofit provider, which in some cases can be more costly. Alternatively, some districts may choose to build their own networks, especially if they can obtain affordable pricing options.

Many states are demonstrating leadership in this area by offering districts cost saving options for ample broadband connectivity. Currently, based on data from all 50 states plus Guam, 28 states have a statewide K-12 education broadband network, 10 states utilize regional networks and 18 states have alternative connection models, such as state master contracts, statewide consortia or other models to provide broadband to districts and schools.

Statewide Broadband Networks Examples



California: California launched the [K12High Speed Network \(K12HSN\)](#) in 2006. K12HSN provides network connectivity to 100% of the county offices and nearly 90% of schools and districts. The California Department of Education funds the K12HSN with annual budget of \$20 million and contracts with CENIC

(Corporation for Education Network Initiatives in California) to administer the network. The state has invested \$77 million for [state broadband infrastructure upgrade program](#) that has connected nearly 400 schools with still more to go. The costs are significant, but necessary to bring broadband to schools that sometimes relied on cellular data or outdated digital subscriber lines (DSL).



Maine: Maine provides broadband connections to K-12 schools through a cooperative consortium, [Networkmaine](#), formed by the Maine Department of Education, the Maine State Library, the University of Maine System, and the Maine Office of Information Technology.



North Dakota: North Dakota delivers a single statewide computer network to all public K-12 schools, libraries, higher education institutions and state and local government offices. Created by the 1999 legislative session, the statewide network is known as [STAGEnet \(Statewide Technology Access for Government and Education\)](#).

The STAGEnet strategic goals and objectives focus on providing broadband connectivity, internet access, and other networking services. Participation is required by state law to ensure common access and security.



Ohio: In 1999-2000, the legislature created the [Ohio K-12 Network](#) to provide funding to assist school districts in connecting to the statewide, K-12 educational technology network. The Ohio K-12 Network offers services to all public school districts in the state, linking classrooms to each other and the internet, while providing access to voice, data, video, electronic mail and other educational resources for students, teachers and administrators.



Utah: The [Utah Education and Telehealth Network \(UETN\)](#) connects K-12 schools, technical colleges, institutions of higher education and public libraries, as well as patients and health care providers throughout the state. UETN's success is based on collaboration with lawmakers, the Governor's office, and education and health care leaders. Teaming up with technology and telecom providers, the state delivers cost effective services in urban, suburban and rural areas.



Washington: The state's [K-20 Educational Network](#) is a high-speed, high-capacity network that connects colleges, universities, K-12 school districts and libraries across the state. Launched in 1996 with funds from the state legislature, the network pipeline provides a single, cost-effective solution to meeting the diverse video and data needs of the state's entire educational community—in communities large and small, urban and rural.

Regional Broadband Networks Examples



Minnesota: The [Minnesota Education Technology Networks \(METN\)](#), a cooperative of regional networks, provides regional network development, support and leadership to Minnesota school districts. The process for joining a regional network varies slightly by region, but generally school districts can join any network that could provide them with service. Most school districts have relied on the Federal E-rate program to afford high speed broadband, so they use the corresponding competitive bid process either independently to choose a regional network or the regional network completed a competitive bid process through E-rate for the regional broadband network as a wide area network for all members. The networks are coordinated by a cooperative or nonprofit education agency that provides services to the K-12 education system. Minnesota estimated that currently 50%- 74% of school districts utilize one of the regional networks.



New York: Currently, there are 12 [Regional Information Centers \(RICs\)](#) organized under the Board of Cooperative Educational Services (BOCES). Typically, a RIC serves several BOCES within their region, and by regionalizing services, the RICs increase the buying power of a district and promote consistent technical standards. This cost-effective system continues to reduce the financial burden on localities and has leveled the playing field so that no matter the size of a district, the best resources are available for students. Many, but not all school districts contract with RICs for services, including broadband. The state estimates that over 75% of school districts contract with RICs for broadband services.



Texas: Texas has 20 regional education service centers that have regional networks. Each independent school district may purchase services from any education service center, however school districts are not required to purchase any service from a regional education service center. Texas estimates that over 75% of school districts utilize the regional education service centers for broadband.

Alternative State Broadband Connectivity Models



New Jersey: [The NJ Digital Readiness for Learning Assessment Project \(NJDRLAP\)](#) was launched in 2014 as a collaborative partnership between the Educational Services Commission of New Jersey and the NJ Department of Education to improve Internet access among K-12 schools. It has become one of the most successful cooperative purchasing initiatives in the state, with more than 265 school districts using the program so far. Since inception, NJDRLAP has increased average Internet bandwidth by 2.5 times and decreased the cost of access by 88%. Overall, the initiative has saved \$260 million for participating organizations, enough money to keep 500 teachers in New Jersey classrooms.



Pennsylvania: In Pennsylvania, the [PAIUnet](#) provides both the statewide network and a statewide purchasing consortium in an effort to provide high-speed broadband services and quality programs to every district in the state. PAIUnet continues to offer a variety of services and programs that support campus connectivity as well as communication, collaboration, and content management across commonwealth schools and libraries.



Wisconsin: [BadgerNet](#) is a contract between the state department of administration and AT&T, where AT&T commits to providing 1 gigabyte of service to any school in the state. The state pays AT&T a contracted rate per circuit and then charges districts a monthly fee resulting in a significant subsidy for school districts.



Education Networks of America

STATE AND DISTRICT EXEMPLARS

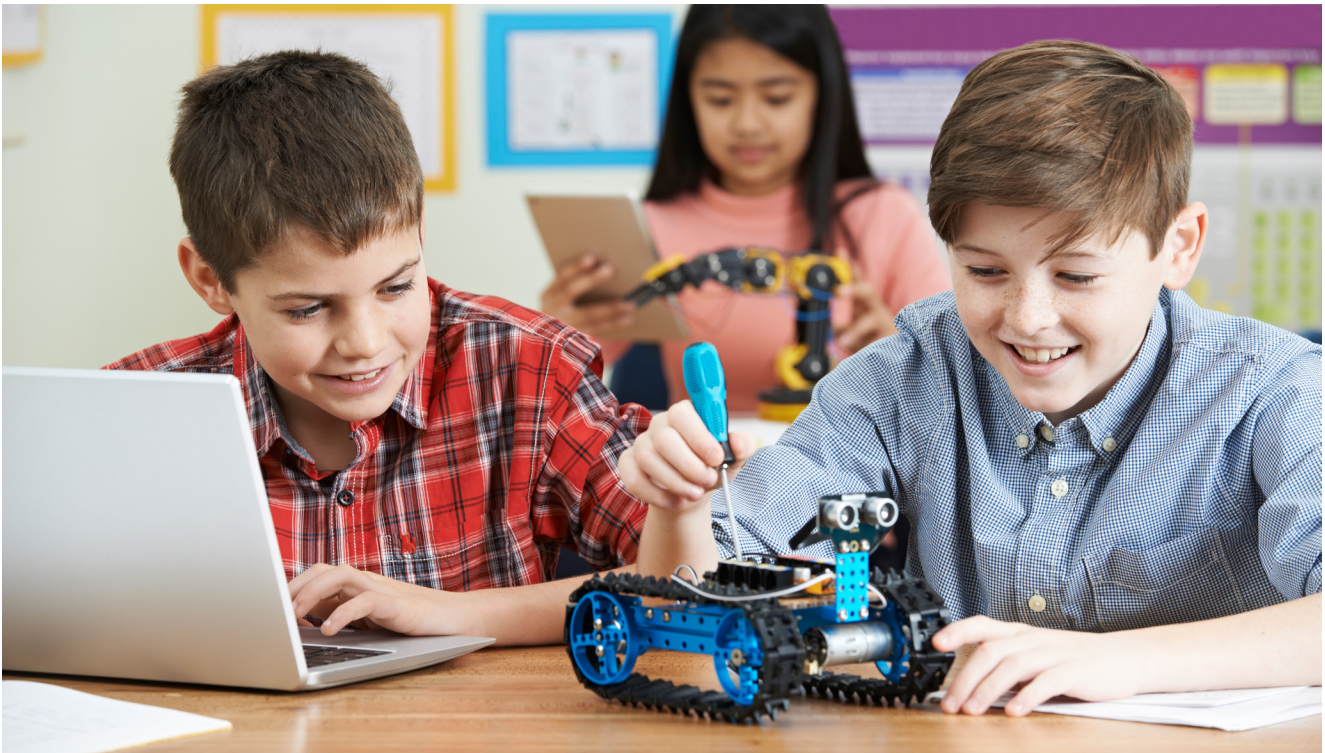
From coast to coast, high-speed broadband is becoming the gateway to the future of education. Check out ENA's [success stories](#) and case studies to see how districts are using enhanced connectivity services to positively impact teaching, learning and operations.

FEDERAL FUNDING

The goal of the Federal Communication Commission's E-rate program is to ensure that all schools and libraries have ample bandwidth to meet the educational needs of students and library patrons. Funding categories include Category 1 (broadband) and Category 2 (internal connections/managed internal broadband services). Category 1 services include internet access and data transport between school facilities. Category 2 services include internal connections (Wi-Fi) within a school. Discount maximums are determined by school enrollment and poverty level.

E-rate modernization dramatically increased the number of school districts receiving Wi-Fi funding from pre modernization (14%) to post modernization (83%). [EducationSuperHighway](#)

In February 2019, the [FCC Category 2 Funding Report](#) recommended that the FCC retain the Category 2 budget approach based on the Category 2 flexibility originally provided in the 2015 [E-rate Modernization order](#). The FCC established five-year Category 2 budgets to make funding for internal connections more equitable, predictable, and more broadly available. This occurred in recognition of the importance of internal connections, particularly robust Wi-Fi networks, the role they play in enhancing educational opportunities for students and library patrons, and the potential for these networks to close the digital divide. The Bureau's review of the data from the first five-year Category 2 budget cycle showed that the Commission's goals in creating these budgets have largely been met. Policy adjustments are still pending at this time. SETDA advocates for a continuation of the new Category 2 budget approach.



STATE FUNDING

Currently, based on data from 48 states plus Guam, states provide funding for external broadband connections, internal wireless connections and off campus access. Specifically, 22 states provide direct state funding for broadband connectivity, with 11 states providing funding directly to the state broadband network and 11 states providing funding directly to the district. Additionally, 14 states provide state funding for internal wireless connections. Several states allow funding to be used for either external broadband connections or internal wireless connections. 21 states offer a statewide contract for internal wireless connections that LEAs can purchase from. Seven states provide funding for off campus access. The following examples highlight state efforts in funding external connections, internal wireless connections and off campus access.

External Connections Funds



Indiana: The Indiana Department of Education State Connectivity Grant program assists school districts with annual connectivity costs. The grants are funded per [Indiana Code 4-34-3-2](#), School and Library Internet Connection. Schools receive \$3.4 million and libraries receive \$1.6 million.



New York: The state's [Smart Schools Bond Act](#) supports school districts' efforts to connect their school buildings to high-speed broadband that supports technology-enabled and digital instruction and learning. Funds used for technology infrastructure investments must increase the number of school buildings that meet or exceed the FCC standards adopted in 2014.



North Carolina: In July 2007, the North Carolina legislature established the [School Connectivity Initiative \(SCI\)](#) to provide funds for broadband access, equipment, and support services that “create, improve, and sustain equity of access for instructional opportunities for public school students and educators.”

In May 2015, the legislature expanded the SCI to support internal connections for all public schools, providing an additional \$12 million of recurring funding.

Internal Wireless Connections Funds



Alabama: The Alabama Ahead Act was implemented in 2015 to leverage E-rate discounts and focus on the improvements their schools required for Wi-Fi infrastructure needs. These needs are guided by a Wi-Fi standards protocol created by AETA now called Alabama Leaders in Educational Technology ([ALET](#)).



Massachusetts: The [Digital Connections Partnership Schools \(DCPS\) Grant](#) is a competitive, matching state grant program that provides funding to public school districts to ensure robust internal and external connectivity.

Off Campus Access Funds



Illinois: The [Illinois Learning Technology Purchase Program \(ILTPP\)](#) is a statewide cooperative of Illinois K-12 educational entities that aggregate buying power and expertise to procure technology products and services to offer aggressive pricing on technology products and services. Through ILTPP, Kajeet offers entities substantial discounts including a 23-62 percent discount on SmartSpot® mobile devices and a 25-47 percent discount on Education Broadband™ data services. In fiscal year 2018, Illinois schools who used the ILTPP had an average cost savings of 21% for all products and services purchased.



[Homework Gap Funding Sources](#) Explore Kajeet's free, comprehensive database of funds and grants that can be used to procure outside the classroom internet access in districts and schools.



Iowa: Iowa's governor recently announced that \$1.3 million for [broadband grants](#) are now available through the Office of the Chief Information Officer (OCIO) to improve broadband access for citizens and eliminate underserved areas across the state.



Virginia: The Virginia Department of Housing and Community Develop (DHCD) administers the [Virginia Telecommunication Initiative](#) grant to localities to expand broadband to localities. The primary objective for the Virginia Telecommunication Initiative (VATI) is to provide financial assistance to supplement construction costs by private sector broadband service providers to extend service to areas that presently are unserved by any broadband provider. DHCD plans to award \$4 million to eligible applicants to provide last-mile services to unserved areas of the state.

Future Funding



New Mexico: In New Mexico, three very rural districts in the west central part of the state, Magdalena, Quemado, and Reserve are paying the highest price in the state for minimal bandwidth. New Mexico has launched a [consortia project](#) to apply for special construction to bring fiber to the schools in those districts, as well as three public libraries in the area. Quemado is one of the most difficult districts in the country to connect to broadband according to an [Edweek article](#) published in November, 2015.



West Virginia: In West Virginia, the state plans to continue funding of the Tools for Schools (TFS) Initiative as well as funding earmarked by Allowances for Improvement of 21st Century Technology Systems. This [Public School Support Program](#) statute is a plan of financial support for the public schools in the state that specifies statutorily the responsibilities of both the state and the fifty-five county school districts.



9 STATES
have future
funding plans
(outside of E-rate)
for connectivity.

EMERGING BROADBAND POLICIES

SETDA supports the continuance of the educational eligibility and use requirements for Educational Broadband Service (EBS) spectrum. EBS spectrum is currently reserved for licensing to accredited educational institutions, governmental organizations engaged in the formal education of students, and non-profit organization that provide educational services to these educational institutions to meet student and community educational broadband needs.

Model EBS cases of educational entities that built their own networks include Northern Michigan University; Albemarle County (VA); Kings County Office of Education (CA); and Imperial County Office of Education (CA), demonstrate this spectrum's potential to make a meaningful difference for students and communities. Successful public-private partnerships have also been created through leasing EBS spectrum to a commercial operator. For example, non-profit organizations like Mobile Beacon's uncapped 4G LTE service is used by 848 schools, 950 libraries, and 4,759 non-profit organizations throughout the country, often providing a means for districts and schools overcome off campus access issues. These models include examples of education-focused public private partnerships, innovative multi-agency community collaboration and a relentless commitment to boosting rural student broadband connectivity and closing the homework gap.

In 2008, [Northern Michigan University \(NMU\)](#) received its first EBS license and launched the country's first educational WiMAX network (geographic service area), providing thousands of students with ubiquitous off-campus access for the first time. This carrier-grade service, coupled with mobile and fixed-wireless receivers, allowed students the flexibility to learn anywhere. In 2014, NMU applied for six additional EBS licenses to expand service to K-12 students and many members of neighboring rural communities who could not afford internet service. With its EBS authorizations, funding, and equipment secured, the university built its [Educational Access Network \(EAN\)](#), which is the nation's largest, self-deployed, educational network covering nearly 12,764 square miles of rugged terrain and providing high-speed, uncapped internet access where such service had previously been nonexistent, unreliable, or prohibitively expensive.

In 2018, the FCC initiated a proposed rulemaking that proposes to eliminate the educational use requirements for Educational Broadband Service (EBS) and remove the requirement that this spectrum be held by educational and nonprofit entities. [Mobile Beacon](#) and its 450,000 end users will be impacted by this decision, and NMU's ability to expand and build out Michigan's Lower Peninsula would be forfeited.

WHAT IS EBS?

The 2.5 GHz EBS spectrum is the only licensed spectrum available to educational institutions to connect their communities. Where EBS has been licensed to educational institutions, EBS is connecting tens of thousands of schools, libraries and other anchor institutions, and through them, millions of students and families that were not otherwise served by commercial broadband offers. EBS has evolved from a broadcast to a broadband service, and new, off-the-shelf technology makes this spectrum a very promising resource for closing the broadband equity gap. For over two decades, the FCC has not made new EBS licenses available in roughly 50% of the U.S., mostly in rural areas. Making this spectrum available to rural educators has the potential to drive rural deployment, increase access to educational services, spur economic growth and close the homework gap.

“ We believe that EBS should continue to be an asset optimized to benefit educators and students. In each geographic area, EBS should be made available to the entity that can best leverage its capability and potential in offering educational internet to the community. ”

–Utah Education and Telehealth Network

STATE BROADBAND GUIDELINES/POLICIES FOR DISTRICTS

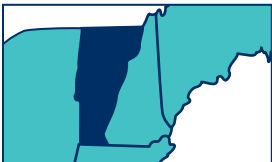
As part of state guidelines, 18 states included SETDA's 2016 recommendations for broadband connectivity, published in [The Broadband Imperative II: Equitable Access for Learning](#). SETDA developed these recommendations based on research and consultation with experts in the field. Recommendations included broadband capacity targets for connection to the internet service provider (ISP) based on the size of the district (number of students). This method allowed education stakeholders to better understand some of the nuances between very small districts (under 1,000 students) compared to large districts (over 10,000 students). The publication also included WAN recommendations. In September 2019, SETDA will release the next iteration in the Broadband Imperative series with updated recommendations for education broadband capacity targets.



External Broadband Examples



Maryland: The Maryland K12 Broadband Policy Academy worked individually with all 24 local school districts to ascertain broadband connectivity and to develop strategies for supporting and improving connectivity using the FCC and SETDA recommendations. As a result, the number of schools needing fiber upgrades dropped from 56 to 5.



Vermont: The [2017 Digital Learning Plan](#) references broadband connectivity and provides recommendations to schools in how to forecast future needs. Vermont references the SETDA recommendations.



Wi-Fi Implementation Examples

While, there is no “one-size-fits-all” approach for internal wireless connections, states share policies and/or guidance for districts around the development of high-quality wireless networks.



Kentucky: The state coordinates a district group to develop specific policies/guidelines for all districts via the Office of Educational Technology at the Department of Education, providing [contracts](#) with specific criteria for network and voice hardware as well as Wi-Fi based on a nomination process.



Louisiana: Louisiana sets statewide [goals and targets](#) for implementing reliable Wi-Fi, LAN and WAN architecture in PK-12 schools. The state bi-annually collects and reviews school technology readiness and provides individual assistance to school systems in order to meet the state’s goals.



Oklahoma: Oklahoma adopted the FCC recommended connectivity goals for 2018, including Wi-Fi capable of supporting 1:1 learning in every classroom and learning area. The state developed a [Wi-Fi Best Practices guide](#) to provide guidance to districts.



23 STATES
provide policies and/or guidelines for districts for the implementation of internal wireless connections.



Thanks to the E-rate modernization, which provides funding for Wi-Fi and internal school network connections, tremendous progress has been made over the past three years. A large majority (69%) of respondents report they are “very confident” in their network’s ability to support one or more devices per student.



– [CoSN’s 2018-19 Annual Infrastructure Report](#)

WI-FI STATE LEADERSHIP CASE STUDIES

Published by SETDA & ENA in 2017, [State Wi-Fi Leadership for Fostering Digital Learning Ready K-12 Schools](#) explores the steps states are taking to address the wireless equity gaps that exist among their schools. Leaders from Illinois, New Mexico, North Carolina, and Utah outline the planning, policy, funding, and management approaches their state agencies and education technology leaders are adopting regarding Wi-Fi, and they share their recommendations for promoting and/or creating equitable access opportunities to high-quality Wi-Fi connectivity.



OFF CAMPUS ACCESS

Many students do not have adequate access to the internet at home—often referred to as the “homework gap,” the gap between students whose internet connections at home are slow or non-existent—and those who have home connections with adequate speed. According to the [Pew Research Center Fact Tank](#), 17% of teens can’t always finish their homework because they do not have reliable access to a computer or the internet. Reliable off campus internet access is a problem disproportionately common in rural and underserved communities, with more than half of states reporting that both availability and affordability in rural areas impacts student internet access off campus. In urban areas, affordability is often more of an issue than availability of service.

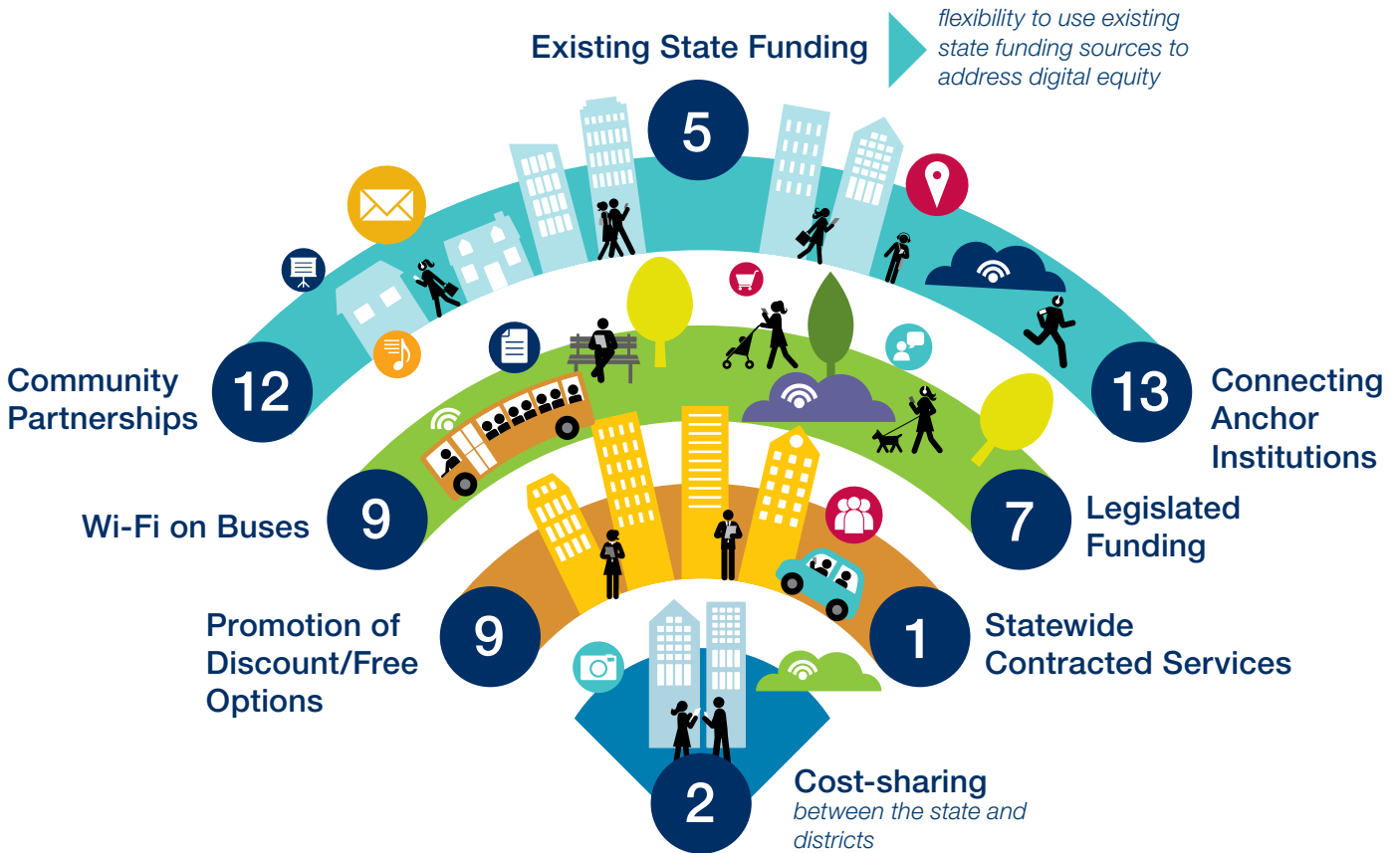


The [National Collaborative for Digital Equity \(NCDE\)](#) works to eliminate the digital divide as a barrier to economic and educational opportunity. NCDE strategic priorities are: mobilize states and communities to undertake sustained efforts to eliminate the digital divide; provide guidance for partnership development; and generate and disseminate research and evaluation on effective digital equity and economic inclusion practices through GIS mapping.

Strategies

Twenty-nine states have developed strategies either formally or informally to address affordable off campus internet access for students, especially in low-income and rural areas.

Strategies for Affordable Off Campus Internet Access for Students



Off Campus Access Examples



Alaska: The Alaska State Library is a division within the Alaska Department of Education and Early Development and has a strong working relationship together. Often, the public library is the only location in rural villages for students to connect to the internet.



Missouri: In Missouri, several public libraries offer rental devices, mobile hotspots or Mi-Fi to their patrons. Some districts installed Wi-Fi on their buses to improve off campus connectivity for students.



Nebraska: In Nebraska, an estimated 15-20% of public K-12 students are either unserved or underserved for home internet access. Most public libraries and schools leave their Wi-Fi routers on after hours so students can access the internet from the parking lot. A joint project between the State CIO's Office and the State Library Commission piloted six school/library fixed wireless connections where public library internet speeds for Homework Hotspots increased by 1,500.



Virginia: In Virginia, the VDOE is collaborating with key stakeholders to hold a *Digital Equity and Inclusion: Closing the Homework Gap* on July 8, 2019. The goal of the Summit is to leverage community partnerships to build capacity for and develop shared digital equity and inclusion solutions. The VDOE is also in the process of educating school technology leaders about EBS and the potential of this technology to provide broadband access to communities in need.

Many states coordinate with libraries to support off campus access for students, particularly students that do not have reliable, robust access at home.

—SETDA 2019 Broadband Survey

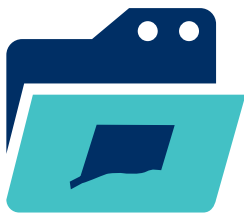
“ Mobile Beacon’s service provides connectivity to our refugee students and their families, giving them access to school and community resources that might otherwise not be available to them. It’s making a big difference in the lives of many of our students. ”

—Joe Hackenmueller, Supervisor,
Educational Technology, Anchorage School District

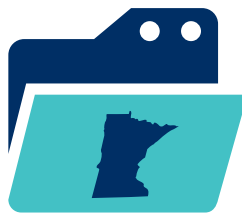
SUMMARY

This publication highlights the importance of state leadership and the various ways states strive to support districts and schools to achieve equitable digital learning opportunities for all students both on and off campus. SETDA and its state member leaders play a pivotal role in driving high-speed broadband access to all students to best prepare them for college and careers. No one state has the same policies or practices, yet all states are providing leadership. State education agencies should continue to work with other state agencies and regional organizations to coordinate projects to close the digital divide.

This fall, as a complement to this publication, SETDA will release a report providing updated recommendations for education broadband capacity targets. As wireless connectivity on campus and off campus access continue to be an important component of access, this upcoming publication will highlight challenges and recommendations on these topics. The publication will also delve into emerging broadband policies at the federal and state level.



[Connecticut
Case Study](#)



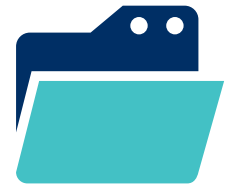
[Minnesota
Case Study](#)



[Kentucky
Case Study](#)

State K-12 Broadband Leadership 2019

Connecticut Case Study



STATE K-12 BROADBAND LEADERSHIP

Connecticut is committed to ensuring scalable, high-performance, cost-efficient broadband to its public schools and libraries. The [Connecticut Commission for Educational Technology](#) (Commission), created in 2000, serves as the educational technology advisor to schools, libraries, and institutions of higher education and started with a mission to connect public schools and libraries to the internet. The Commission created and oversees the [Connecticut Education Network \(CEN\)](#), the first among — and one of only a few — state networks in the country to connect every district to fiber. CEN connects virtually every institution of higher education as well as 62% of libraries in the state, in addition to serving as the primary public resource in K-12 broadband provision and support in the state. CEN is a member of Internet2 and The Quilt, both of which help with policy and advocacy for K-12 and other anchor institutions. In addition to acting as the governing body of the Network, the Commission has worked with advocacy groups such as EducationSuperHighway to provide no-cost technical and procurement support to districts through the Connecting Connecticut Classrooms (C3) initiative. The [Connecticut Department of Education](#) advises on E-rate, and the [Connecticut Office of Consumer Counsel](#) has undertaken research and advocacy efforts to help ensure access to affordable broadband to communities and learners outside of traditional institutions. In addition to these state entities, six [regional service centers](#) offer fee-for-service technical support to districts.

1.8 Million Citizens Served

Community Anchor Institutions	Public K-12 Districts	Public Colleges & Universities	Private Colleges & Universities	CT Public Libraries	CT Municipal Government	CT Government Branch	Open Access
Connected	170	19	17	144	102	2	38
CT Total	170	19	20	238	169	3	n/a
% of Total	100%	100%	85%	51%	60%	66%	n/a

Connecticut does not provide state funding for direct external connections or internal wireless connections. However, since CEN operates on a cost-recovery basis, the network can offer virtually unlimited and low-cost broadband services to the state's schools, colleges, and libraries. CEN members appreciate education-specific services, including bundled Internet and secure transport via multiple 100-Gbps backbones, content caching, CIPA filtering, distributed denial of service (DDoS) mitigation, and managed firewalls. CEN school districts may purchase tiered bandwidth services within 1 Gbps, 10 Gbps, and 100 Gbps fiber optic Ethernet handoff options. Connecticut offers districts the option to purchase from a statewide contract for internal wireless connections. Currently, the state does not plan on funding internal wireless connectivity for school districts but has launched an awareness and education campaign to encourage the use of E-rate funds.

STATEWIDE K-12 EDUCATION BROADBAND NETWORK

The [Connecticut Education Network \(CEN\)](#) was launched in 2000 and in 2005 became the first statewide network in the country to connect every district to fiber. CEN's estimated operating budget is \$6.8 million, of which \$3.2 million is consumed by the K-12 community. Currently, 100% of school districts use the network, serving more than 600,000 students, faculty, and staff. In total, CEN connects 1.8 million citizens statewide.

HIGHLIGHTS

Connecticut's approach to addressing broadband for schools was to build a regional statewide network to provide ubiquitous and equitable service and connect all districts as well as other educational institutions such as regional education centers, libraries, colleges, and universities. Connecticut was the first in the country to connect all districts to an all-optical network in 2005 and then in 2013 upgraded all districts to a 1Gbps handoff standard. CEN has set a high bar for internet service in the state and region.

Connecticut Education Network (CEN)



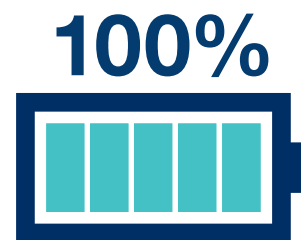
Launch Year
2000



\$7 Million
Estimated
Operating Budget



1.8 Million
Number of Users
Served



100%
of LEAS use the
Network

NETWORK PERFORMANCE

CEN operates an all-optical, high performance, low-latency, multi-gigabit network throughout Connecticut. The fiber footprint brings CEN services to every town, providing ubiquitous and equitable access to all communities. CEN's design, leveraging a meshed network core and resilient edge ring design, brings unparalleled reliability and resiliency to its members. The entire network is specifically tuned for large research-intensive transfers. As a result, CEN can deliver low-latency, intensive Internet and network-based voice, video, and data services. All Internet services include, at no additional cost,

advanced security features such as distributed denial of service (DDoS) detection and mitigation and CIPA Web content filtering. CEN observes the principals of Net Neutrality and provides the ability to burst on demand without penalties, caps, throttling, or otherwise impeding traffic. CEN's partnership with Internet2 allows the member base to connect to other regional networks as well as cloud providers at no additional cost.

CEN provides a 24x7 Network Operation Center (NOC) that monitors the infrastructure for device up/down status, utilization, trend analysis, change management, and event escalation. As part of performance management, CEN analyzes network trends on a monthly and annual basis, including 95th percentile usage; peak usage; data volume; utilization data for business and non-business hours; traffic destined for the commodity Internet, Internet2, peering exchanges, and on-net caches; and DDoS activity.

NETWORK UPGRADE PROCESS

Connecticut's process for providing network upgrades includes capacity management to add additional bandwidth as needed, including failover conditions and customer-funded fiber builds. Connecticut has historically funded network upgrades with state bond funds as well as federal E-rate dollars, awarded for special construction and extensions of the existing network. Connecticut gathers data on customer satisfaction for continual improvement and to help determine network upgrade needs. Data is collected for continual improvement channels via help desk (ticketing) system feedback and time to resolve, word of mouth, and input from members of three advisory councils. Based on this input, the network provides upgrades in a strategic, tactical, and proactive manner. These upgrades serve the broad base of needs from connected members, who provide advice and counsel.

OFF CAMPUS ACCESS

Various state agencies, library consortia, community-based groups, and the State Broadband Office coordinate efforts to support student access to off-campus connectivity. State efforts include the promotion of discounted and free access programs, community partnerships, and connecting anchor institutions. Off campus access strategies are driven by availability in rural and urban areas; affordability in urban areas; and adoption rates, regardless of availability and affordability.

The Commission leads state-level efforts to advise communities on connecting students of all ages to broadband outside of traditional learning institutions and provides guidance across leadership, measurement, resources, and sustainability. The Commission developed the [Digital Equity Toolkit](#), a set of recommended steps and resources to help communities get students of all ages online outside of school, with access to high-quality devices and the skills to make the best use of these learning tools. The Commission is undertaking a pilot program for libraries, institutions of higher education, and schools to connect students throughout their community via the Eduroam authentication framework. Additionally, many communities have undertaken initiatives to raise awareness of low-cost broadband programs (e.g., Comcast Internet Essentials). A number of districts deploy hotspots or 3G-enabled devices to enable students to get online outside the home. Even as schools, libraries, and universities increasingly leverage the power of technology to support teaching and learning, many students do not have access to the devices, broadband, or training they need to learn.

DISTRICT IMPLEMENTATION

Connecticut provides [guidance](#) to districts on external broadband connections between the school networks and the state network on a district-by-district basis. Connecticut references the 2016 SETDA recommendations as a resource for districts as they consider their current and future planning for external broadband connections. CEN also consults directly with schools regarding their external broadband and managed wireless connectivity needs.

Farmington Public School Example

[Farmington Public Schools](#)

highlights how CEN supports teaching and learning in the district, including the unique

relationship between CEN and the district. CEN provides immense support to the curricular needs of Farmington students and teachers. State-mandated online testing and the need for students to develop higher-level competencies in digital learning have driven demand for internet connectivity. CEN provides a ready, reliable, resilient, and cost-effective connection to Farmington schools. This means that our teachers, students, and administrators can connect with subject-matter experts and peer groups, and access the vast amount of digital learning resources available online, anytime. Farmington students of all ages regularly engage with authors, industry experts, and peers via web conferencing technology. Our students are heavily engaged in robotics and computer science, and they leverage Internet2 resources provided through CEN. The benefits of CEN reach beyond basic internet connectivity

to the resilience and reliability of the services that the network provides, such as DDoS mitigation, network monitoring, and content filtering, all at no additional cost. Farmington considers CEN a partner, colleague, and friend in the delivery of a high-quality educational experience to our students.



CEN IMPACT

- Offer reliable and resilient, high-bandwidth connections for E-Sports club competitions.
- Host regional science Olympiad and Lego FIRST Robotics competitions for 300+ attendees with little impact on bandwidth and connection speeds..
- Support multi-location Hour of Code events for K–12 students and the community with no significant impact on bandwidth.

Norwalk Public Schools Example

At [Norwalk Public Schools](#), having a network that is reliable, cost effective and service oriented has been a key factor in the success of our educational technology initiatives. Norwalk has approximately 11,600 students and 2,000 employees. We are a one to one chromebook district currently in grades 6-9 and are expanding this program in the upcoming year. We have over 14,000 district devices (not including personal devices such as phones) connected to our network. Since most of our applications, resources and assessment are online, having a quality network connection is important. The CEN offers support to make sure we can deliver quality instruction and resources to our students. This understanding of a school district's needs is critical, especially to small school systems who may not have the resources to support their environment.



We rely on CEN not only as an internet service provider, but as a partner that understands our needs as a school system.



– Ralph Valenzisi, Chief of Digital Learning and Development,
Norwalk Public Schools

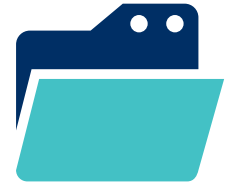
FUTURE PLANS

CEN has just completed its 2019–2024 strategic plan. The plan will move CEN forward in the coming years by clarifying its value to the state and by advancing the needs of its diverse and expansive community. CEN’s goals for the coming years include the following:

- **Provide Value** – Diversify and scale services cost-effectively to enhance Internet and network capabilities, strengthen security, and increase understanding of how to leverage those technologies.
- **Ignite Innovation** – Empower members through a suite of services tailored to their needs that encourage excellence and innovation.
- **Foster Collaboration** – Engage the local membership and members of the national research and education community to develop and share resources and insights that address the professional and technology needs of each member constituency.
- **Promote Advocacy** – Raise awareness and support of CEN’s value by equipping members and policymakers with timely and accurate information about the network.
- **Enhance Core Resources** – Pursue opportunities to further leverage, develop, and enhance CEN’s core technology and human resources for the foundational success of the program in pursuit of member needs.

State K-12 Broadband Leadership 2019

Minnesota Case Study



STATE K-12 BROADBAND LEADERSHIP

Minnesota's constitution calls for citizens to have access to an equitable public education system. As is the case with many states, Minnesota has concentrations of population in both urban centers and large areas of rural communities. Broadband access provides students with a wide range of educational opportunities both within and outside of their communities, regardless of whether they live in a large city or a small rural township. In addition, state leadership recognizes the significance of broadband connectivity for promoting economic development, employment, and business growth. From a state level, agencies such as the Department of Employment and Economic Development (DEED) and the Minnesota Department of Education (MDE) provide funding through grant opportunities and aid programs to help communities, schools, and public libraries achieve high speed broadband access. The [Minnesota Office of Enterprise Technology \(MnIT\)](#) provides a backbone network (leased, not state owned) throughout the state to deliver connectivity to cities, counties, public schools and libraries in various areas of Minnesota.

Since 1993, at the regional level, the [Minnesota Education Technology Networks \(METN\)](#), a cooperative of regional networks, provides regional network development, support and leadership to Minnesota school districts. METN member cooperatives provide network coordination, procurement, and other support to help school districts acquire and manage broadband networks for instruction and education management. METN has also provided limited cooperative purchasing opportunities.

STATE FUNDING

Minnesota provides state funding directly to the district for external broadband connections and directly to the regional networks. Through regional partnerships, the median cost of broadband (per mbps) in Minnesota schools has dropped 84% from \$15 in 2015 to \$2.35 in 2018. While cost has decreased, the amount of bandwidth necessary for students to participate in digital learning has increased. In the same period of time, the median bandwidth speeds available on a per student basis has increased almost four fold from 226kbps to 890kbps. Minnesota currently provides limited state funding for connectivity on buses and previously provided one-time grants that could be used to obtain hotspot devices for students to use off campus. Minnesota does not provide funding for internal wireless connections.

STATEWIDE K-12 EDUCATION BROADBAND CONNECTIVITY

Minnesota provides education broadband connectivity through 19 regional networks. The process for joining a regional network varies slightly by region, but generally school districts join any network that can provide them with broadband services. Most school districts rely on the federal E-rate program to afford high speed broadband, so they use the corresponding competitive bid process either independently

In 2016, a joint partnership, between the Office of the Governor, the Minnesota Department of Education (MDE), the Department of Employment and Economic Development (DEED) and the national non-profit EducationSuperHighway established the [Minnesota K-12 Connect Forward Initiative](#) to ensure that all students in the state have access to scalable infrastructure, high-speed affordable bandwidth, and ubiquitous Wi-Fi for digital learning.

to choose a regional network or the regional network completes a competitive bid process through E-rate for the regional broadband network as a wide area network for all members. The networks are coordinated by a cooperative or nonprofit education agency that provides services to the K-12 education system. Minnesota estimates that 50% - 74% of districts participate in a regional network.

Highlight

In Summer of 2018, [Southwest West Central Service Cooperative](#) (SWWC) completed a project to provide broadband services to approximately 50 sites, including schools, libraries and other government agencies. The newly awarded contract includes fiber-based Wide Area Network (WAN) connectivity among the schools and libraries and the SWWC's data centers, as well as managed routers providing a level of cybersecurity. The new network replaced microwave links that previously served all but two of its 30 member districts, with fiber connections providing higher speeds, better reliability and unlimited potential. This project helped close the broadband gap, reaching 99% of the state's school districts meeting current goals for broadband connectivity.

In receiving a fully fiber-based Wide Area Network solution, we will be able to provide more advanced services allowing our members to receive secure, enterprise-class technical operations at a fraction of the costs if they were to try to achieve the same quality on their own. It is the goal of all of our member school districts to provide more opportunities with the greatest level of data protection and cyber security available to benefit the 20,000 plus students to be served.

—Josh Sumption
SWWC's Director of Technology

POLICIES/GUIDANCE FOR DISTRICTS

Minnesota coordinates with other state organizations to coordinate on campus activity to ensure that all students in Minnesota have access to scalable infrastructure, high-speed affordable bandwidth, and ubiquitous Wi-Fi for digital learning. In addition, these organizations provide value added services such as network security, digital curriculum resources, network management, distance learning support, and other enterprise level services. The [Minnesota K-12 Connect Forward Initiative](#) adopted the widely recognized goals for connectivity put forth by groups such as SETDA and the Consortium for School Networking (COSN) and has provided guidance to districts in reaching those goals. The Minnesota K-12 Connect Forward Initiative and Minnesota's Educational Technology Networks do not have specific policies for wireless connections but continue to work with districts to leverage federal E-rate dollars to ensure that districts can implement wireless connectivity within their buildings in a cost effective manner.

The robust regional networks in the state have allowed schools to implement 1:1 programs and utilize learning management systems for instructional programs. Teachers and students have become more adept at utilizing digital learning both on and off campus. In some parts of the state, severe cold, blizzards and heavy snow impact school schedules. It is not unusual to have five to ten or more days of school canceled due to weather conditions. In 2018, the state legislature passed [legislation](#) that allows districts to implement up to five e-learning days per year when school would otherwise not be in session due to unsafe weather conditions. During e-learning days, students access instructional materials online and teachers are accessible via telephone and online means to assist students with their activities. Minnesota's high speed regional networks allow e-learning options for students.

DISTRICT IMPLEMENTATION

[MacPhail Center for Music](#) is a community-based music education non-profit based in Minneapolis, Minnesota. The center operates an [online school partnership program](#) that utilizes video conferencing over high speed broadband networks to bring renowned MacPhail specialists into classrooms throughout the state. Music specialists provide live clinics, sectionals, concert prep, professional development and individual lessons for vocal and instrumental music. Regional networks, such as the [Little Crow Telemedia Network \(LCTN\)](#) and [East Central Minnesota Educational Cable Cooperative \(ECMECC\)](#) and others have supported the participation of many schools in this program by providing equipment, training, technical and financial support. For example, students in Yellow Medicine East, MACCRAY, Braham and Hinckley-Finlayson rural districts (all districts of less than 1,000 students K-12) have received online group and private lessons from music professionals at the MacPhail Center.

OFF CAMPUS ACCESS

In Minnesota, other state agencies, libraries, community-based groups and the state broadband commission work together to coordinate efforts to support student access to off campus connectivity. The state is promoting strategies, both formally and informally, for access to affordable out-of-school broadband for students, especially in low-income and rural areas through legislated funding; promotion of discount/free options; community partnerships; connecting anchor institutions; and Wi-Fi on buses. Off campus access strategies are driven by availability and affordability in rural areas; minimum broadband standards, such as speed, safety and security, as well as limited service options for consumers. Specifically, through efforts by the Governor's Task Force on Broadband and the Office of Broadband development, statutory goals were put in place calling for all homes and businesses to have access to broadband service of at least 25 Mbps download and 3 Mbps upload by 2022 and that by 2026 all homes and businesses would have access to broadband service of at least 100 Mbps download and 20Mbps upload from at least one provider. To help incentivize the deployment of broadband in rural areas, the state funded grant programs and projects that offer new or upgraded broadband service to unserved and underserved areas of the state. Grant programs have totaled \$85.6 million to date and \$500,000 was awarded to provide schools with mobile hotspots available to students without adequate broadband access at home. The grant programs were administered by the Office of Broadband Development and funding for the programs has been consistently supported by the Governor's Task Force on Broadband. [Grants](#) have also been awarded to provide schools with mobile hotspots for students without adequate broadband access at home.

FUTURE PLANS

Minnesota's regional broadband networks will continue to seek cost-effective broadband solutions for all Minnesota school districts by leveraging state and federal funding initiatives and local partnerships with an eye toward always providing the bandwidth that districts need to fully participate in digital learning and utilize digital resources. Additionally, the regional networks will continue to expand enterprise level services designed to share resources that are expensive for smaller, often rural, districts to afford on their own. Services that will improve network and data security, provide access to online resources, bring educational opportunities directly to the schools and improve administrative procedures within districts.

COLLABORATION ACROSS THE GLOBE

Video conferencing enables:

- Face-to-face, real time discussions
- Ability to view live events, such as surgeries or space walks
- Engage in virtual reality expeditions growth in underserved areas.

State K-12 Broadband Leadership 2019

Kentucky Case Study



STATE K-12 BROADBAND LEADERSHIP

The 1990 [Kentucky Education Reform Act \(KERA\)](#) created the Kentucky Education Technology System (KETS) authorizing the Office of Education Technology (OET) within the Kentucky Department of Education (KDE) to provide internet access to all school districts. One of the key components included in the legislation was the development of a technology masterplan, typically covering 6 years. The Master Plan for Education Technology guides decisions about network infrastructure and future bandwidth needs and provides technology leadership and guidance. In 1994, Kentucky schools adopted ethernet as a local area network standard and by 1995 implemented the first statewide K-12 network in the country having every K-12 district connected to the internet. In FY2007, based on a bandwidth forecast from OET, the state legislature established a recurring budget to dramatically increase funds for the network infrastructure. This funding established the [Kentucky Education Network \(KEN\)](#) in conjunction with the KETS program. Currently, guided by the technology masterplan, OET uses state funds to purchase and manage the statewide K-12 private middle mile network and internet access on behalf of all school districts. For KETS standard technology items including wired and wireless classroom connections, OET provide a specific dollar amount per student. In order to use the state funds, each district must match the state funds dollar for dollar. At the discretion of the district, state funds are available to escrow for up to three years. OET provides a statewide contract for internal wired and wireless connections that districts can purchase from. Currently, 100% of districts purchase from this contract. Districts may also use the state funding for out-of-school access, including providing connectivity on school buses.

KETS Guiding Principle

Ensure a minimum standards of equitable anytime, anywhere, always-on access to instructional and administrative education technology services for all students, teachers, and administrators.

Biannually, Kentucky conducts the [Teacher Voice and Working Conditions Survey \(TELL\)](#) survey of teachers and administrators to inform the school, district and state education improvement planning processes. The survey includes ten data elements that directly relate to technology access in schools. Kentucky consistently receives high response rates to the survey with positive feedback. In the most recent publicized results, 85% of respondents reported that the reliability and speed of the internet in schools was sufficient to support instructional practices. The state's [Digital Readiness](#) tool provides snapshots, reports and trends of technology infrastructure and data gathered from the TELL survey. The interactive tool enables users to view results by state, district, or school.

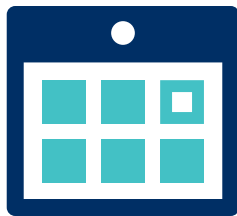
Highlights

Kentucky was one of the first states to adopt the FCC standard of 100 mbps/1000 students at minimum. The state provides bandwidth to districts and schools in an equitable, efficient and cost effective manner. Kentucky works with district leaders to provide the amount of bandwidth a district needs to achieve their instructional goals. Not all district are implementing digital learning at the same pace, so connectivity needs may differ. State technology leaders focus on statewide technology services, such as Internet

access and security; allowing district technology officers to focus on the specific technology needs of their schools. OET carefully monitors district bandwidth usage throughout the year, as well as 10 “bandwidth drivers” in order to forecast growth and file for E-Rate as a statewide consortium. With the support of OET field staff, KDE and school districts filed for a record \$52M in E-Rate funds for FY2020.

STATEWIDE K-12 EDUCATION BROADBAND NETWORK

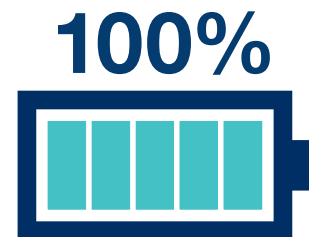
KEN is comprised of a Middle Mile network which connects all 173 district hub sites to each other and to the internet. As a local control state, each district is responsible for providing connectivity from the district hub site to each individual school and other district buildings. The network provides secure Internet access to nearly 700,000 administrators, teachers and students. A significant benefit of the statewide network is the ability to integrate security services. The OET has enterprise level services for Firewall, Internet Content Filtering, Anti-Virus, DDoS, and statewide VPN services.



Launch Year
1995



700,000
Number of Users Served



of LEAS use the Network

Network Performance

OET uses various tools to collect and analyze network usage. Kentucky monitors both network traffic and total usage (GB transferred). The statewide internet and district hub usage is based on the “95%” calculations, peak, and average demand. Overall internet usage and individual district usage, is monitored throughout the month to insure adequate capacity. The network vendor is responsible for monitoring specific performance metrics and providing monthly reports on network performance, security status, and district bandwidth upgrades.

Network Upgrades Process

For SY2018-19, all districts have at least 250 Mbps per 1,000 students. OET aims to provide bandwidth on an as needed basis to best meet district instructional and administrative needs. In order to determine recommended upgrades for upcoming year, OET monitors district network utilization, assesses known bandwidth drivers (i.e. Student to Device Ratios, digital learning coaches, and LMS usage, verifies network management “best practices”, and assesses confirmed district plans for new initiatives). Final determination is based on the above mentioned analysis and funding availability. Since SY2008-09, all recommended upgrades were fully funded and implemented. Kentucky gathers data on customer satisfaction via the TELL survey and Bright Bytes survey, and relies on these customer satisfaction surveys to advocate for network upgrades. In SY 2013-14, customer satisfaction surveys played a significant part in persuading legislators to increase funding for the network.

POLICIES/GUIDANCE FOR DISTRICTS

The state coordinates a district group to develop specific [policies/guidelines](#) for all districts via the Office of Educational Technology at the Department of Education, providing [contracts](#) with specific criteria for network and voice hardware as well as Wi-Fi based on a nomination process.

DISTRICT IMPLEMENTATION

Education leaders in Johnson, Carter, Barren and Jefferson counties are reimagining learning opportunities for both teachers and students by creating collaborative and innovative experiences powered by digital tools. Johnson County is using digital tools and collaboration to reimagine professional learning by allowing teachers to work anywhere and anytime to earn e-badges that provide practical application of digital teaching strategies. In Carter County, based upon data from the TELL survey, 91% of teachers report that they have sufficient access to instructional technology, including devices, software and the internet. The district is able to harness the efficiency of digital tools to gather and visualize student data in new ways, allowing for more opportunities to personalize learning for students. Barren County is expanding digital opportunities for students with their Innovation Academy that is preparing students for computer science and technology fields through practical experience and industry certifications. Jefferson County is collaborating with partners to implement a digital backpack program where students can create products to show mastery of learning in different ways and carry that with them through school and beyond. With 89% of students with home access, most students can easily access their digital backpack at home.

OFF CAMPUS

Off campus access is tracked via the [KETS Digital Readiness Survey](#). Based on 2017-2018 data, approximately 80% of students reported having Internet access at home. As with many states, Kentucky has a gap between available affordable access in certain areas of the state. In order to address this gap, OET promotes provider based solutions to help students with off campus access. However, it's ultimately the responsibility of parents to help students meet off campus access needs. Some districts provide Wi-Fi on buses to help meet off campus access needs. In some areas of the state, schools provide hotspots for students to check out to take home or a bundle of a device and hotspot. Districts also work with providers to inform families about options for internet access. Two districts lease the education broadband spectrum (EBS) to Sprint telecommunications company. Sprint provides cell phones and hotspots for students and staff to check out on an as needed basis to support student learning.

FUTURE PLANS

Kentucky works to connect the dots between the [state education strategic plan](#) and the [KETS 2018 – 2024 KETS Master Plan](#) to ensure that the technology is available to meet the educational goals. Bandwidth upgrades and capacity needs continue to increase. OET is planning to upgrade the bandwidth of 24% of districts this coming year due to network growth. Kentucky continues to focus on future bandwidth needs as they plan for the next network contract in 2022-2023.

Other areas which OET intends to focus on now and in the near future include:

- Address the importance of having adequate numbers of education technology roles/positions in all districts to ensure that existing and new education technology is (a) extremely reliable and available in the classroom, (b) maximized, (c) secure and safe, and (d) provides data of the highest quality
- Address funding required for basic cost of living increases, previous budget cuts to basic services and projected growth by districts (e.g., Internet consumption)



24%

**of districts
are planned for a
bandwidth upgrade
this coming year
due to network
growth.**

- Recognize the most crucial education technology professional development needs identified by teachers and identify who can best address the needs
- Focus efforts on shifting basic cyber security and safety to a prime position on the radar screen of teachers and district staff members
- A higher percentage of districts annually examining education technology investments to determine which technologies are and are not being used/maximized
- Identify and communicate the EdTech product/design standards, EdTech safety and security, EdTech services, and reporting requirements of other schools that apply to charter schools

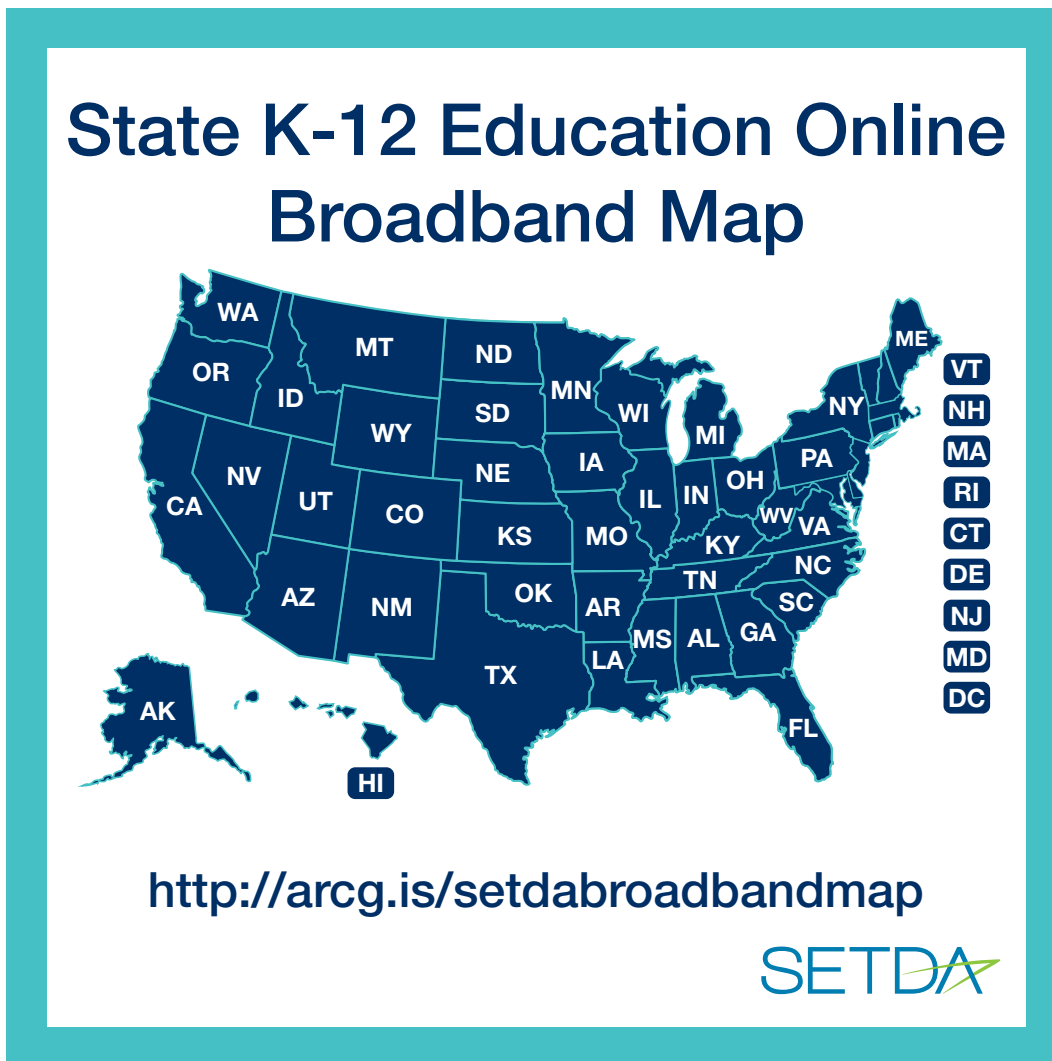
APPENDIX A: CREDITS & ACKNOWLEDGMENTS

SETDA 2018-2019 Board of Directors

In addition to the contributions by the SETDA Board of Directors, SETDA would like to thank both members and contributors for their helpful comments and insights, including:

- **Geoff Belleau**, Education Programs Consultant, California Department of Education
- **Julia Benincosa Legg**, State E-rate Coordinator, West Virginia Department of Education
- **Jerome Browning**, State E-rate Coordinator, Utah Education Network (UEN)
- **Doug Casey**, Executive Director, CT Commission for Educational Technology
- **Dr. John Chadwick**, State E-Rate Coordinator, New Mexico Public Education Department
- **Dr. Susan M. Clair**, Learning Infrastructure Coordinator, Virginia Department of Education
- **Christopher Coffman**, Supervisor of Instructional Technology, Missouri Department of Elementary and Secondary Education
- **DeLilah Collins**, Assistant Director ESEA Programs Office, E-rate Coordinator Colorado Department of Education
- **Bridget Duff**, Director, Education Sales Solutions and Strategy, Cox Business
- **Melinda Fiscus**, Digital Access Coordinator, Learning Technology Center of Illinois
- **Michael Flood**, VP Strategy, Kajeet
- **Stan Freeda**, State Educational Technology Director and Online Learning Specialist, New Hampshire Department of Education
- **Erich Grauke**, Principal Consultant & State E-Rate Coordinator, Illinois State Board of Education
- **Vince Humes**, Director Innovative Technology Solutions, PA-PAIMS
- **Marc Johnson**, Executive Director, ECMECC
- **Lil Kellogg**, SVP, Education Networks of America (ENA)
- **Brady Kraft**, Principal, Parana River Group LLC
- **Todd Lawrence**, State E-Rate Coordinator, Idaho Department of Education
- **Katherine Messier**, Executive Director, Mobile Beacon
- **Carol Mosley**, K-12 Education Technology and E-rate, Louisiana Department of Education
- **Dan Myers**, Director, Regional Information Center BOCES NY
- **Tim Sizemore**, Program Manager, Kentucky Education Network, Kentucky Department of Education
- **Andrew Wallace**, President, Maine Educational Technology Directors Association
- **Jerry Winkler**, Educational Data Management Division/CIO, California Department of Education
- **SuAnn Witt**, State E-rate Coordinator, Nebraska Department of Education

APPENDIX B: STATE K-12 EDUCATION ONLINE BROADBAND MAP



<http://arcg.is/setdabroadbandmap>

Complementing this paper is an online story map to provide real time details regarding State K12 Broadband Leadership. The story map includes the following details regarding:

- State Leadership Overview
- State Network Details
- Regional Network Details
- Alternative Model Details
- State Strategies
- State Broadband Funding



SETDA would like to thank ESRI (link to <https://www.esri.com/en-us/industries/education/overview>) for their support of the map design and implementation and for ESRI's on-going support as a SETDA annual partner. <https://www.setda.org/partners/>

APPENDIX C: RESOURCES

[Broadband and Wi-Fi Guide to Implementing Digital Learning \(SETDA\)](#)

With the influx of new technology and increased connectivity, focused strategic planning is more important than ever to ensure digital learning opportunities for all students and educators. Most school districts have made investments in technology equipment, bandwidth and networking, training teachers and supporting both the technology and those using it.

[Broadband Progress Report 2016 \(FCC\)](#)

The 2016 Broadband report reveals that there are significant improvements in broadband deployment, but the digital divide persists. Connectivity for schools has improved since the FCC modernized the E-rate program; however, 41 percent of schools still have not yet met the FCC's short-term goals of 100 Mbps/1000 students for connectivity capable of supporting digital learning.

[BroadbandUSA](#)

Earlier this year, NTIA launched BroadbandUSA to provide communities with technical and strategic advice on how to expand broadband access and adoption. As part of this new initiative, NTIA developed the Guide to Federal Broadband Funding, a comprehensive manual of federal broadband funding opportunities and information about state and local funding sources for broadband. The guide details a wide range of opportunities. While the guide is not meant to provide an exhaustive list of all federal funding opportunities, it can serve as a starting point for communities to explore potential federal financing options.

[ConnectHome](#)

In 2015, to support increased broadband access at home, the White House launched the [ConnectHome](#) Initiative, a pilot initiative to help accelerate broadband adoption by children and families living in HUD-assisted housing. Collaboration between local governments, Internet service providers, nonprofit organizations and other stakeholders offers broadband access, devices, technical training and digital literacy programs for residents in assisted housing units. Twenty-seven cities and one tribal nation are participating in the pilot program.

[CoSN Infrastructure Survey](#)

This is the sixth year CoSN has conducted a survey of U.S. K-12 district connectivity. Formerly known as "CoSN's E-Rate and Broadband Survey," the survey has since expanded to include broader questions about school infrastructure. As a result, the survey has nearly doubled in size from 31 questions in 2013 to 59 questions this year. While some questions have been phased out, added questions about the Cloud, data security, interoperability, and school bus Wi-Fi have resulted in a net-sum gain in questions. The increase in the number of questions reflects the increased complexity of variables now commonplace within school districts' infrastructure. This report— based on 386 district responses, with one authorized response per district—will hopefully serve as a valuable resource for starting edtech conversations with policy and decision-makers and understanding the full range of infrastructure issues

[Distance Learning and Telemedicine Loan and Grant Program \(DLT\)](#)

DLT provides funding to meet the educational and health care needs of rural America. Through loans, grants and loan/grant combinations, advanced telecommunications technologies provide enhanced learning and health care opportunities for rural residents. Eligible purchases include: Interactive video equipment, audio and video equipment, terminal equipment, data terminal equipment, inside

wiring, computer hardware and software, computer network components, acquisition of instructional programming that is a capital asset, acquisition of technical assistance and instruction for using eligible equipment.

[Every Student Succeeds Act](#)

The ESSA reauthorizes the 50-year-old Elementary and Secondary Education Act (ESEA), the nation's national education law and longstanding commitment to equal opportunity for all students. The new law builds on key areas of progress in recent years, made possible by the efforts of educators, communities, parents, and students across the country.

[Every Student Succeeds Act: A Progress Report on Elementary and Secondary Education, Executive Office of the President, December 2015](#)

This report summarizes the progress the country's schools have made since 2008, including: adopting higher academic standards in nearly every state; increasing high school graduation rate to 81 percent; investing billions of dollars in high-quality early education; training 100,000 excellent STEM teachers; and expanding access to high speed Internet to 20 million more students.

[Fixed National Broadband Map](#)

Recognizing the value of broadband data visualizations, the Federal Communications Commission released a new Fixed Broadband Deployment map in February 2018 to display new data collected by the FCC from carriers on FCC Form 477, which is updated twice annually. Like the old map, the new map provides key information about broadband deployment for consumers, policymakers, researchers, economists, and others.

[Lifeline Program](#)

The FCC's Lifeline program provides millions of families with discounted monthly telephone service. On March 31, 2016, the FCC voted to modernize the program to include broadband access. For the first time, Lifeline will support stand-alone broadband service as well as bundled voice and data service packages to help provide low-income Americans with access.

[National Education Technology Plan](#)

The 2016 NETP plan articulates a vision of equity, active use, and collaborative leadership to make everywhere, all-the-time learning possible.

[Navigating the Digital Shift 2018: Broadening Student Learning Opportunities](#)

This publication highlights how state policies and guidance are supporting the transformation to digital learning, specifically the policies and processes around the selection, curation, procurement and funding of digital instructional materials. Evidence of state leadership in these areas—equity of access; accessibility for all students; interoperability; and student data and privacy—is highlighted throughout this publication.

[State Wi-Fi Leadership for Fostering Digital Learning Ready K-12 Schools – June 2018](#)

This publication explores the steps states are taking to address the wireless equity gaps that exist among their schools. Leaders from Illinois, New Mexico, North Carolina, and Utah outline the planning, policy, funding, and management approaches their state agencies or education technology leaders are adopting regarding Wi-Fi, and they share their recommendations for promoting and/or creating equitable access opportunities to high-quality Wi-Fi connectivity.

[Schools, Health & Libraries Coalition](#)

The Schools, Health & Libraries (SHLB) coalition supports affordable, high-capacity broadband connections for anchor institutions and their surrounding communities. SHLB also supports federal initiatives to support broadband and works with the FCC to promote capital investment in the E-rate reform.

[Stories of EdTech Innovation](#)

These stories of innovation can connect districts, schools, and educators trying similar things so that they can learn from each other's experiences.

[Technology in Education: An Overview](#)

This article presents an overview of the trends, opportunities, and concerns associated with classroom technology.

- What Is Personalized Learning?
- What Is 1-to-1 Computing?
- What Is Blended Learning?
- What Is the Status of Tech Infrastructure and the E-Rate?
- How Is Online Testing Evolving?
- How Are Digital Materials Used in Classrooms?
- What Are Open Educational Resources?
- How Are Virtual Education and Distance Learning Doing?

[The Next Generation Network Connectivity Handbook, July 2015 \(Gig.U\)](#)

The Next Generation Network Connectivity Handbook is primarily focused on community-led broadband, usually through a public-private partnership. For example, a city negotiates with a private entity to design, deploy, maintain, and/or operate a broadband network.