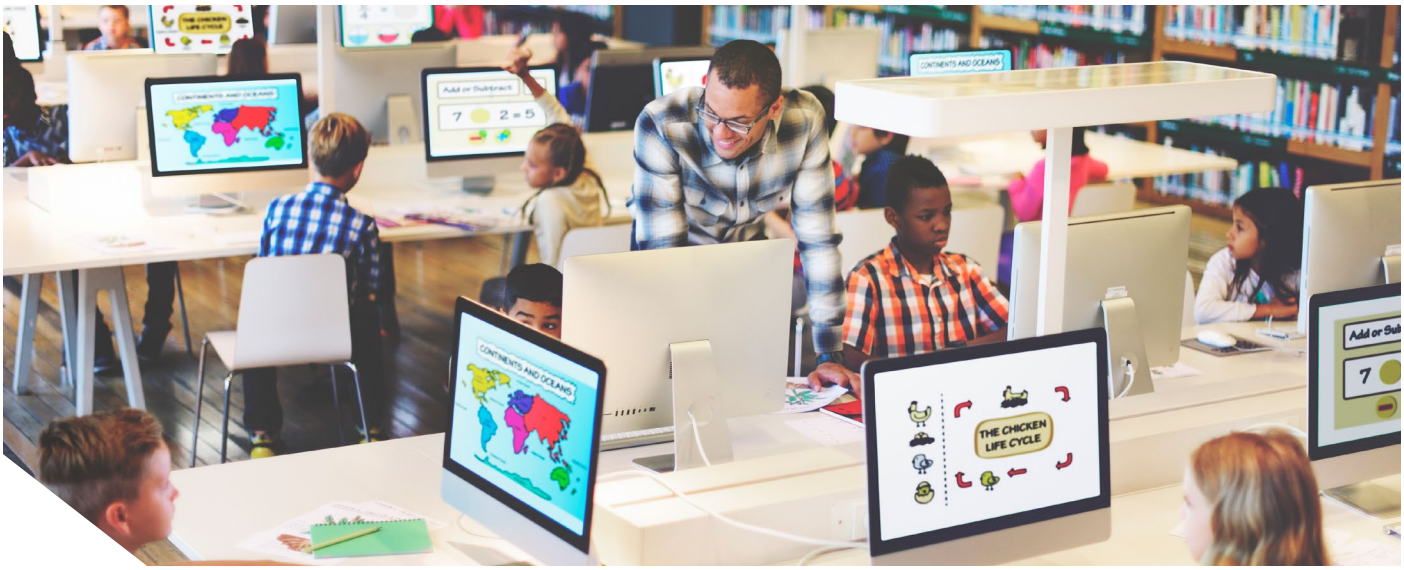


Flexible Connectivity for K-12 Schools, Buses & IoT Applications

How to Leverage Secure, Reliable Networks to Enhance Learning

Overview

Gone are the days of blackboards, three-hole punches, and freshly sharpened No. 2 pencils. Today's K-12 students and teachers depend on laptops, tablets, cloud apps, data-driven instruction, and nonstop Internet connectivity.

Due to widespread shifts such as online testing for Common Core and the rapid rise of cloud-based applications, many school districts are seeking networking solutions that meet their evolving needs without complicating network management or creating new security vulnerabilities. K-12 IT teams are asked to adopt new technologies while solving an array of challenges related to bandwidth, cybersecurity, reliability, flexibility, scalability, and cost-effectiveness.

Because of these needs, LTE-based broadband and WiFi have become vital components of K-12 network architectures. Wireless WAN connectivity is no longer a luxury for school districts; it's now essential for enhancing and personalizing learning — from main offices to school buses and IoT devices.

This white paper explores the most popular education technology trends in K-12 education, and the role of LTE, WiFi, cloud management, and all-in-one network solutions in addressing the complexities and time and budget constraints currently facing school district IT departments.

The Changing Landscape of K-12 Technology

K-12 education is one of the most essential mainstays of society, but the way it is administered has drastically changed. Schools and districts need to provide Internet connectivity on and off campus, thanks to a vast and growing list of technologies, trends, and advancements.

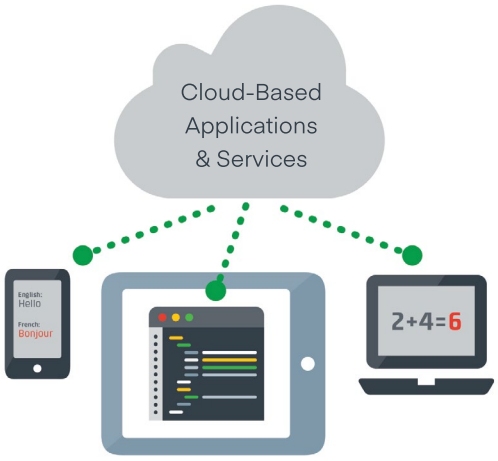
Common Core

In states that have adopted Common Core State Standards, online testing is now a regular and critical event for schools. While such online tests offer certain benefits, uninterrupted Internet and ample bandwidth are critical.

Cloud Applications

Instead of constantly replacing textbooks and computer programs, schools can use cloud-based applications and Massively Open Online Courses (MOOCs) to hone students' skills in coding, math, foreign languages, and other areas. These services can even be extended onto school buses that provide WiFi.

Meanwhile, teachers can post grades, assignments, attendance, messages, and lecture videos online through cloud-based portals that are accessible to students anywhere. Resources are always available as long as network access persists.



1:1 & Bring-Your-Own-Device

Schools can save money by replacing computer labs with a one-to-one computing policy, also known as 1:1, in which all students have access to their own laptop, tablet, or similar mobile device. Schools that lack the funding to purchase a mobile device for every student often integrate "Bring-Your-Own-Device" (BYOD) into the policy, along with providing as many district-owned devices as possible.

80%

of K-12 IT leaders say their districts are ready or almost ready to conduct online assessments.

COSN's 2018 K-12 IT Leadership Survey Report

1:1 policies and BYOD help level the playing field for students, providing opportunities for every child to utilize technology and cloud apps inside the classroom, on the bus, and even at home.

For network administrators, the wide variety of devices accessing the network increases the complexity of management and security.

AR/VR

Augmented Reality (AR) and Virtual Reality (VR) tools give students remote access to worlds they otherwise wouldn't be able to experience. Students can explore historical events, museums, national parks and monuments, far-off countries, and exotic environments — all from their classroom, using many of the same devices they use for standard coursework. With laptops, tablets, apps, and AR/VR headsets, much of the world is at students' fingertips.

Personalized, Data-Driven Instruction

Educators are using online platforms and mobile devices to conduct assessments that lead to data-driven, personalized curriculum based on each student's interests, abilities, growth, and mastery of content.

Teachers can quickly recognize and respond when students begin struggling with specific subjects and use quizzes to determine which areas need to be reviewed or taught differently prior to test days.

40% of teachers use education technology in every lesson.

The Educational Technology Survey 2018

Child Safety Measures

In an era of heightened awareness regarding child safety, school security has moved far beyond placing a uniformed guard at the main entrance. Districts are implementing Internet of Things (IoT) security such as Radio-Frequency Identification (RFID) cards to let students scan on and off buses and in and out of buildings. Parents and schools can easily track attendance and the location of children.

Additionally, Internet-connected surveillance cameras placed on campuses and in buses send real-time footage to headquarters. The mere presence of these systems often deters dangerous or illegal activity.

Solving K-12 Networking Challenges

Bandwidth

Provisioning and managing bandwidth is a major challenge for IT teams at K-12 schools. The network must be able to handle students and educators constantly using devices to stream audio/video and access cloud applications all over campus.

During periods with particularly high data usage, IT administrators need enough flexibility to adapt to fluctuating bandwidth needs at a moment's notice, but without incurring exorbitant fees that would put undue financial burden on cost-conscious districts. For example, at the beginning of the day — when students, teachers, and administrators are all logging on the network — the team should be able to ramp up bandwidth before throttling back down as the day progresses.

Solution

Augment or replace existing connectivity devices with a cloud-managed LTE-enabled solution. Enterprise-grade routers that support dual modems enable load balancing, additional bandwidth, and wireless-to-wireless failover. In addition, choose a data plan that allows data pooling among locations to provide adaptability during high- and low-usage times.

For automated, policy-based traffic steering, make sure your solution also includes LTE-optimized SD-WAN technologies.

Cybersecurity

School district IT departments have to maintain compliance with laws enacted to protect students against obscene and dangerous content on the Internet. The Children's Internet Protection Act (CIPA) is critical to student safety — and more difficult to uphold as students and their devices become increasingly mobile. Failure to comply with CIPA puts students at risk and exposes the district to legal and financial liabilities.

Also, the personal data of minors is highly lucrative and coveted by hackers, and children's Social Security numbers usually are less protected than adults' numbers. Like corporations and government entities, schools must protect the data of their employees and the people they serve, but often with fewer resources.

Solution

Choose a network solution with a built-in firewall, easy VPN capabilities, robust network segmentation, multiple SSIDs, content filtering, and the ability to remotely manage updates and add-on security integrations with industry-leading platforms through the cloud.

Cybersecurity and broadband/network capacity are the top two priorities for IT leaders in K-12 education.

COSN's 2018 K-12 IT Leadership Survey Report

Reliability

When schools today experience Internet downtime — losing access to key files and online tools — practically everything slows to a stop, including instructional time, teacher duties such as grading and testing, and messages from the school to parents. In buses, tools such as student WiFi, location tracking, and streaming security footage lack value unless WAN access can be upheld.

SOLUTION: Seek a hybrid WAN solution that supports LTE, Ethernet, WiFi-as-WAN, and other links through one router. Additionally, use a cloud management tool that sends alerts and features cloud-based Out-of-Band Management, letting IT personnel address downtime and other issues without visiting the school.

Flexibility & Cost-Effectiveness

With limited budgets, school districts need network solutions that make sense today and for years to come. Integrating LTE Internet into existing wired architectures can be complex, fiscally burdensome, and prone to human error — especially for districts that don't use a cloud management service for monitoring, managing, and troubleshooting from headquarters.

The rapid rate of technology advancements and school expansion creates a frenetic pace of change that is difficult for IT managers to accommodate on limited budgets. IT administrators need to be able to manage and troubleshoot mobile deployments remotely with as little impact on staff and finances as possible.

SOLUTION: Deploy an all-in-one network solution that accommodates both wired and wireless links, with high-performance LTE connectivity supporting multiple carriers and modems simultaneously. Ideally, find a solution that is packaged with a cloud management service, allowing instant updates, carrier switching, and troubleshooting from anywhere.

Success Story

L.A. Unified School District

L.A. Unified School District (LAUSD) deployed Cradlepoint's purpose-built branch network solutions with multi-WAN functionality to keep its administrative offices and school sites connected, especially for the Smarter Balanced Assessment Test. Based on the Common Core, the test's three components all require constant Internet access.

LAUSD uses Cradlepoint's branch connectivity and branch continuity solutions — including Out-of-Band Management functionality — that support wired and wireless links through a single device. The district's IT team uses Cradlepoint NetCloud Service to centrally monitor and manage connectivity across more than 700 square miles — reducing truck rolls and man-hours spent troubleshooting.

"If we have a network outage at a school, it is really going to be disruptive to the classroom environment. Having a Cradlepoint solution in place for failover is a real advantage."

Shahryar Khazei,
CIO, L.A. Unified School District

Use Cases for K-12 Networks

Main Building

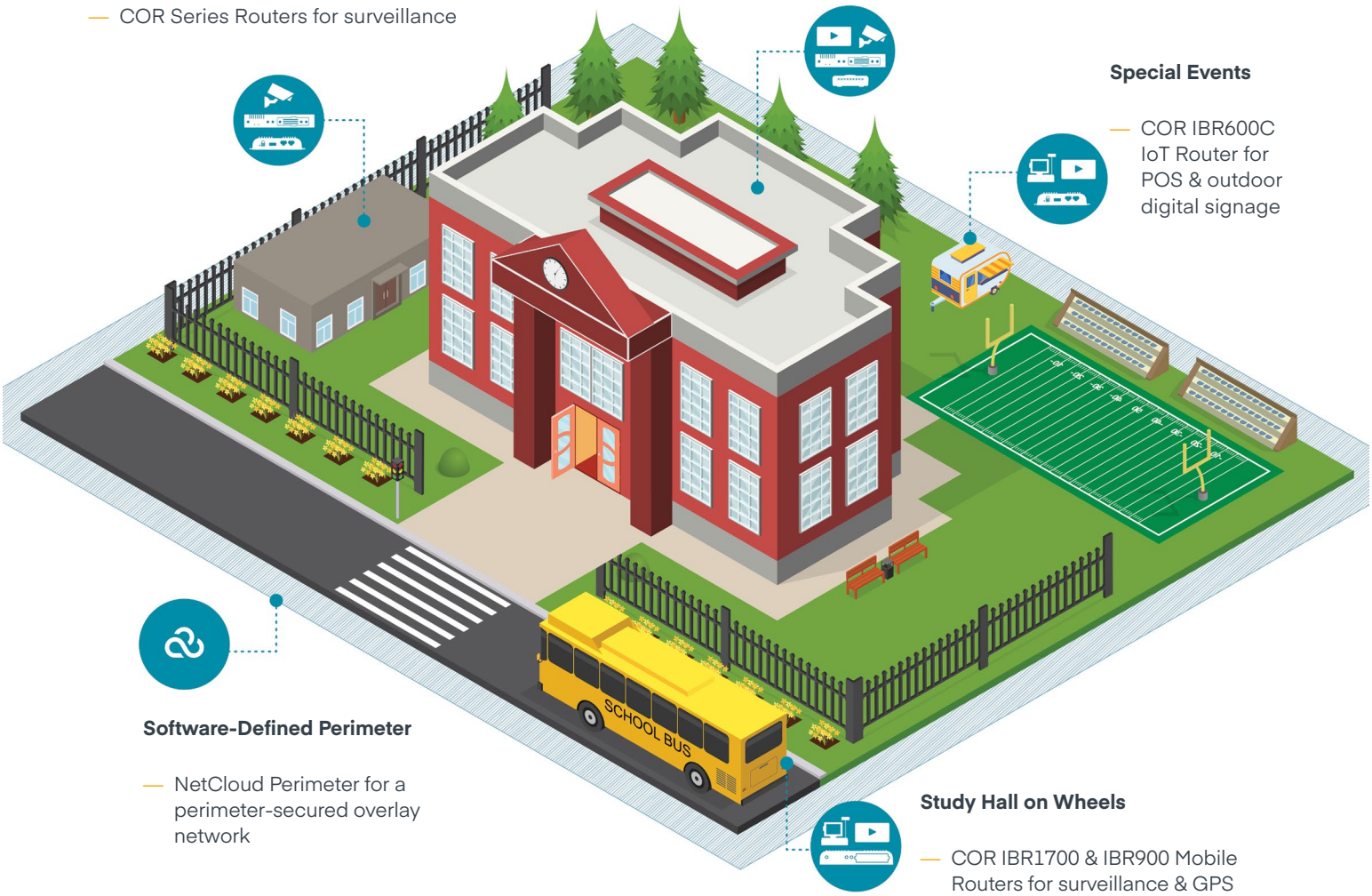
- AER2200 Branch Router for primary routing
- CBA850 LTE Branch Adapter for branch continuity
- COR IBR200 IoT Router for indoor digital signage

Portable Classrooms

- AER2200 Branch Router for primary routing
- COR Series Routers for surveillance

Special Events

- COR IBR600C IoT Router for POS & outdoor digital signage



Software-Defined Perimeter

- NetCloud Perimeter for a perimeter-secured overlay network

Study Hall on Wheels

- COR IBR1700 & IBR900 Mobile Routers for surveillance & GPS tracking

WiFi on School Buses

With a LTE-based mobile router installed aboard a school bus, students traveling to or from home and out-of-town events can use WiFi to complete homework.

LTE makes it possible for a bus driver to alert school administrators and/or stream live surveillance footage back to district headquarters when a dangerous incident is taking place. Also, the district can automatically offload less-essential footage via WiFi the next time the vehicle parks at headquarters.

Some fleet managers require in-vehicle connectivity to enable AVL solutions and to reap insight from rich telematics data that can deepen cost-efficiencies. They also use GPS to keep track of where their buses are at all times. Some schools even offer phone apps that show parents and kids the bus's location.

Main School Building

In a small school building, an all-in-one router provides multi-WAN connectivity and seamless failover through a single device. On a much larger campus, the school's IT team may need a branch continuity solution that converts LTE into an ethernet connection, providing four-nines uptime.

Digital signage is an increasingly common technology at K-12 locations, and not just for the readerboard in front of the main building. School staff can remotely adjust digital signage throughout campus at a moment's notice — without physical intervention. A LTE-enabled IoT router makes it easy to place digital signage anywhere on campus without having to extend fiber or ethernet connections.

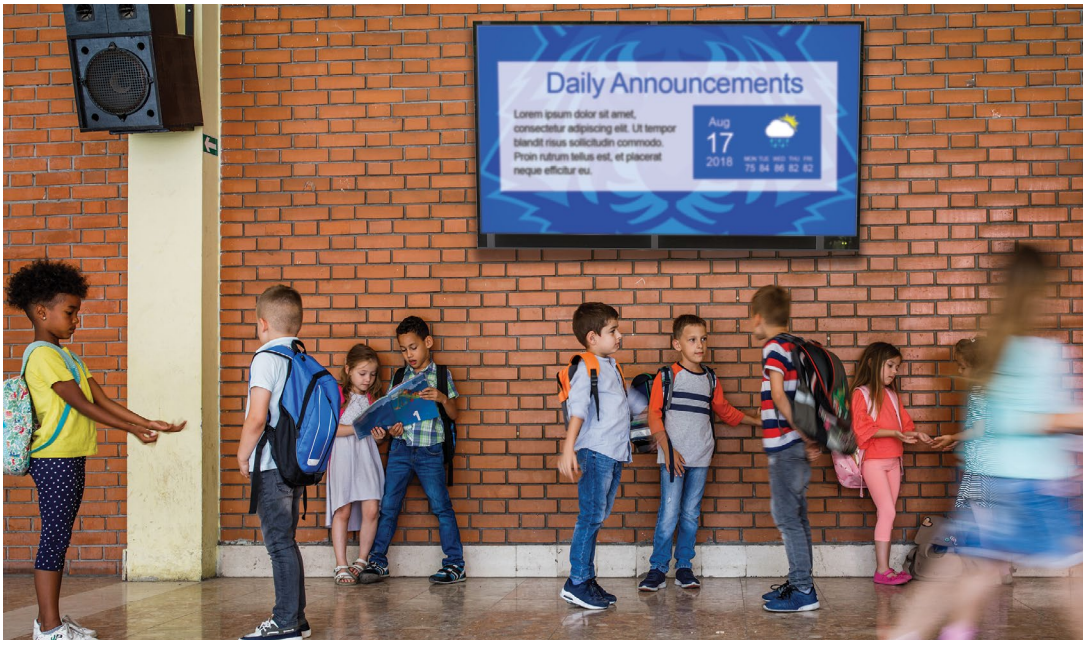
Cloud-based Out-of-Band Management capabilities enable IT teams to use 4G LTE to remotely access either a primary router or any LAN-connected devices. Remote troubleshooting saves schools the time and expense of sending IT specialists to sites suffering from outages or hardware failure.

Education technology investments reached a record

$9.5 billion

in 2017 – a 30% increase from 2016.

Metaari Investments Report



Temporary Classrooms & Portables

Temporary classrooms require connectivity for multiple reasons. Many districts set up makeshift standardized testing areas in gymnasiums and other large spaces. Others use portable buildings for temporary or even long-term classroom space to address overcrowding. These buildings usually are connected via the existing infrastructure, but when that is too difficult or time consuming, using a LTE or WiFI-as-WAN connection via a router helps the district make portables operational more quickly.

Video Surveillance

To help keep children safe, some districts install cloud-managed IoT solutions to maintain a constant connection to security cameras. In addition, some districts have their own police force and install mobile routers within their law enforcement vehicles to maintain data and video connectivity between officers and the district.

Special Events

Most schools host dozens of special events throughout the year, including sports, plays, musical performances, and much more. These days the ability to accept credit card payments is essential, so schools need the ability to provide secure and reliable network access for Point-of-Sale (POS) at a moment's notice.

Success Story

Fresno Unified School District

On average, students who ride the bus within the Fresno Unified School District (FUSD) are riding for 30 minutes. To optimize that time, the district began providing on-board WiFi through Cradlepoint's purpose-built in-vehicle network solutions, allowing students to do school schoolwork on the bus and at events.

To ensure always-on connectivity, the district's IT team can easily switch back and forth between multiple carriers as needed within one service. Also, with Cradlepoint NetCloud Service, the team centrally monitors, manages, and troubleshoots all devices in its fleet network — and extends content filtering to protect students from inappropriate websites.

"You can build on this solution; it's scalable. There are so many other possibilities and benefits that can come from the Cradlepoint connectivity."

Philip Neufeld,
Executive Director of Information Technology, Fresno Unified School District

K-12 Solutions for Branch, Mobile & IoT Deployments

Cradlepoint's all-inclusive NetCloud Solution Packages for branch, mobile, and IoT networks provide K-12 school districts with solutions that combine tailored NetCloud services with fit-for-purpose hardware and a comprehensive 24x7 support plan.

Each Essentials package provides the functionality needed for rapid deployment and time to value. Advanced upgrade packages allow customers to enhance their networks anytime and anywhere with advanced management and edge routing.

Additionally, advanced branch and mobile solution packages provide increased security functionality, including application-aware firewall and CP Secure Web Filter, which is powered by industry-leading Webroot BrightCloud® Threat Intelligence and is fully integrated into Cradlepoint NetCloud. CP Secure Web Filter allows network administrators to actively protect users from web-based threats and ensure IT compliance at the distributed WAN edge.

Schools leveraging branch and mobile solution packages also can easily add third-party tools such as analytics-rich web content filtering (Zscaler Internet Security) and IPS/IDS (CP Secure Threat Management, powered by Trend Micro's industry-leading Deep Packet Inspection Engine).

Learn more at cradlepoint.com/k-12

About Cradlepoint

Cradlepoint is the global leader in cloud-delivered wireless edge solutions for branch, mobile, and IoT networks. The Cradlepoint Elastic Edge™ vision — powered by NetCloud services — provides a blueprint for agile, pervasive, and software-driven wireless WANs that leverage LTE and 5G services to connect people, places, and things everywhere with resiliency, security, and control.

More than 27,000 enterprise and government organizations around the world, including 75 percent of the world's top retailers, 50 percent of the Fortune 100, and first responders in 10 of the largest U.S. cities, rely on Cradlepoint to keep critical branches, points of commerce, field forces, vehicles, and IoT devices always connected and protected. Major service providers use Cradlepoint wireless solutions as the foundation for innovative managed network services. Founded in 2006, Cradlepoint is a privately held company headquartered in Boise, Idaho, with a development center in Silicon Valley and international offices in the UK and Australia.