Wi-Fi

Increasing Customer Value
by Reducing Operational Complexity

ABSTRACT

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This document has been designed to help schools understand key considerations when investigating WLAN technologies to support their digital learning environments. It will explain why appropriate planning, selecting enterprise grade solutions, and outsourcing the assessment, implementation, and management of WLAN infrastructure can dramatically reduce the IT burden of supporting mobile devices. Understanding the best practices of Wi-Fi and choosing the appropriate solution allows the IT department to focus on enhancing the classroom experience with new technology initiatives, rather than troubleshooting Wi-Fi problems.

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Mobility Changes Everything – The Connected Classroom

Mobile devices have transformed the learning experience in many classrooms today, and wireless networks play a key part in supporting technology-driven learning. The connected classroom allows students to unearth a wealth of resources beyond their four walls, and it offers the teachers new ways to engage and inspire. While connectivity has become an expectation of students, as well as a platform for digital learning, the increased number of mobile devices in the classroom also creates many challenges that IT departments are continually facing. With the increasing complexity of wireless networks, how do you achieve the required levels of visibility, capacity, and control without overburdening both your users and IT department?

Beyond 1:1 Computing

School campuses are dealing with an influx of laptops, smartphones, tablets, etc., for school, guest, and personal device access. As schools increase the number of instructional and administrative applications that utilize mobile devices—and, more commonly, open their doors to BYOD for staff and students—there is a growing demand for network capacity. With students now carrying and connecting as many as three or four devices each, mobility is pushing school networks beyond one-to-one (1:1) computing.

This influx drives the need for a more robust wireless network solution, but how do you determine which original equipment manufacturer (OEM) or managed service provider (MSP) to engage, how many access points (APs), and how to optimize speed, security, and reliability? Wireless networks require a lot of planning to guarantee a successful deployment, especially in the school environment.

Key Considerations for Implementing a Wireless Network

There are a number of key considerations district administrative and technology staff should review prior to implementing any type of improvement or re-design of a wireless network. Setting up a secure network for a variety of users factoring in mobility and managing how users access the network requires a number of pre-planning discussions and considerations. These key considerations should be part of a leadership team discussion as a first step in addressing wireless network needs.

Instructional Adoption

Instructional adoption utilizing technology is reliant on a strong confidence level in network stability, reliability, and performance by teachers, administrators, and students. This is key to enabling digital learning. Key stakeholders and leadership teams within the school should be included in the process of planning a Wi-Fi deployment. It is critical to the success of the implementation to thoughtfully discuss the desired outcomes and functionality for the classroom, as well as additional learning and work spaces. This feedback should be integrated into the design and deployment.

Client Selection

Wi-Fi performance is not only dependent on the network infrastructure and design, but also on the capabilities of the client devices. School districts should evaluate client devices for instructional fit as well as Wi-Fi capabilities. Individual student needs as well as overall district instructional requirements should be taken into consideration before purchasing devices. Selecting the correct client *devices* can determine success or failure of a digital learning initiative.

Ensuring Capacity for the Growing Number of Devices

With the network witnessing continued demand for access by a wider range of devices, bandwidth is crucial. 802.11ac has unlocked speeds of Gigabit and beyond, but is that enough? Districts should explore the various implementations of wireless local area network (WLAN) architecture and performance optimization features, in order to realize the true potential their infrastructure, and protect future growth within a single site or across multiple geographic locations. What happens when you add 5,000 more iPads to a school? What is the device impact? What is the impact on user experience? In other words, when you buy devices, think about the wireless infrastructure. What are the chipsets, radio modes, 1x1, 2x2, 3x3, etc.?

Bandwidth

In order for a wireless network solution to operate optimally, classrooms and mobile campuses require a foundational high-capacity broadband infrastructure. The wireless network will only be as capable as the site's bandwidth access. As a guideline, the State Educational Technology Directors Association (SETDA) recommends that school districts meet minimum bandwidth requirements to cultivate and sustain technology-rich learning environments. To access SETDA's recommended broadband guidelines, visit www.setda.org.

The State Educational Technology Directors Association (SETDA) is a not-for-profit organization launched by state education agency leaders to serve, support, and represent their emerging interests and needs with respect to the use of technology for teaching, learning, and school operations[1].

Guaranteeing Network Uptime

If a large proportion of your curriculum relies on a digital learning environment, the supporting infrastructure must be rock solid, otherwise there is a significant impact to class time that places unnecessary stress on the teaching staff. How quickly can your infrastructure and campus recover from service outage or reduced productivity?

Wired vs. Wireless

On-demand access to ubiquitous cellular and Wi-Fi technologies is a necessity in today's hyper-connected global society. Wired infrastructures are still used to support campus wireless networks, but many classroom devices no longer require wired network ports to connect to the Internet. Enterprise Wi-Fi solutions have advanced to support mobile digital learning needs within the school. As such, a significant number of schools are reallocating their funds toward building scalable, robust, and reliable wireless networks. Wireless access reduces the overall expense of supporting a digital learning environment because wired computer labs and cabling no longer need to be moved when desired use of physical spaces change.

Flexibility vs. Security

To cope with the influx of devices, IT departments are balancing flexibility against security in order to meet business needs. There is top down pressure to enable productivity and efficiency, and mobility is a key part of this, however for IT to get the job done, the highest levels of security that *should* be implemented are often neglected in favor of flexibility. School districts need to think about the security needs as well as the flexible access needs of their network users.

Visibility of Users, Devices, and Applications

If your doors are open to BYOD and guest devices, it may not always be clear who exactly is on the network, which devices they are connecting with, what applications are being accessed, and where they are located. Selecting an appropriate management platform is crucial to providing comprehensive visibility and control.

Return on Investment

What extra value does your solution contribute towards the digital learning experience? Wi-Fi offers a unique opportunity to better connect with students through their mobile device, and offer teachers new tools to enhance the learning experience. As schools seek to increase engagement, productivity, and cost savings, capabilities such as analytics and classroom device management could become a key part of the WLAN selection criteria for IT departments.

Wi-Fi as a Service

To ensure that their schools have the seamless connectivity required to enable 21st century learning, many technology leaders are electing to outsource their Wi-Fi network design, implementation, and management to trusted service providers. Wi-Fi as a Service (WaaS) is a growing trend in education due to the escalating requirements for sophisticated Wi-Fi networks supporting the needs of students, educators, and administrators.

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[1] High Speed Broadband Access for All Kids: Breaking Through the Barriers; SETDA, June 2008
http://www.setda.org/priorities/equity-of-access/the-broadband-imperative/

While there are varying interpretations of what WaaS represents, we recommend choosing a service that includes, at a minimum, the physical layer design of the wireless spectrum as well as the design of the Wi-Fi security, network access policies, and integration with the local user database.

These key considerations along with the input gathered from your administrative, instructional, and technology staff will assist you in moving forward with the planning process for you Wi-Fi network enhancements or re-designs.

Ensuring Successful Outcomes

All wireless networks are not created equal. Each building or facility has its own unique physical challenges, limitations, and user demands that should be taken into consideration when deploying a Wi-Fi service. The instruction pedagogy is moving away from the "one-size-fits-all" approach, but technology departments are still being tasked with integrating generic, out-of-the-box wireless solutions that are not tailored to meet their specific needs. In order to create sustainable, robust, and reliable Wi-Fi networks, administrators and technology leaders must look at the bigger picture and plan for the future in terms of coverage and capacity. The following strategies can help you build or enhance your Wi-Fi network to ensure that it meets both the current and future needs of your students, faculty, and guest users.

Wi-Fi as a Service – The Total Solution

To ensure their Wi-Fi networks are future ready, school districts nationwide are using Wi-Fi as a Service (WaaS) solution providers to design, deploy, and/or manage their Wi-Fi networks. The K–12 landscape is rapidly evolving and the roles of all of the involved key players—administrators, teachers, CTOs, and technology staff members—are changing. Today's 21st century technology departments are redirecting their focus toward supporting the integration of instructional technologies and mobile devices. Wi-Fi as a Service enables school districts to implement and sustain enterprise-grade Wi-Fi networks without hiring additional IT personnel. By outsourcing the assessment, design, implementation, training, and management of a school or district's Wi-Fi network to experienced professionals, technology leaders are free to focus on what matters most—the students.

Typical WaaS solution models include:

- Assessment
- Design
- Equipment (APs, Switching, Cabling, and Peripherals)
- Complete Tailored Installation and Implementation
- Activation and Validation of Your Network
- Support, Monitoring, and Maintenance
- Comprehensive Online Visibility of Your Network Activity

Top 10 Challenges of Wireless Networks Facing K-12 Schools: Why Wi-Fi as a Service Solution Helps

Assessment

Design & Configuration

Implementation

Activation

Training
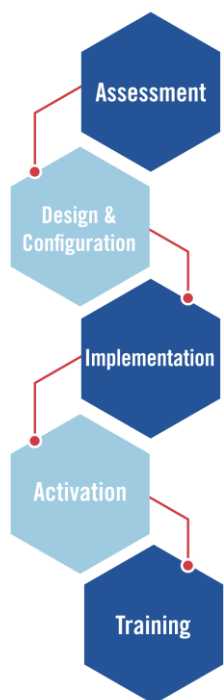
As has been reiterated throughout this paper, the advent of mobile technologies in the classroom has prioritized the need for a comprehensive and reliable Wi-Fi network. The push for mobile learning is greatly impacting the role of today's K–12 technology leaders and staff, with more emphasis than ever being placed on supporting the integration of instructional technologies rather than overseeing and monitoring complex Wi-Fi infrastructure. As such, more technology departments are outsourcing the design, implementation, and management of their Wi-Fi network to outside industry professionals. Wi-Fi as a Service (WaaS) enables schools to provide seamless and reliable access to online resources while freeing up technology staff to focus on what matters most—the students.

Today's wireless network challenges may be solved using a WaaS solution. Here are 10 challenges facing schools today.

An outdated, out-of-the-box, or do-it-yourself Wi-Fi solution

Challenge:

Many schools find that their current Wi-Fi solutions are antiquated and difficult to update and maintain. Designing a robust "do-it-yourself solution" is challenging with today's complex mobile needs. Wi-Fi design is not easy and that often requires engineering experience to design a Wi-Fi environment.

Solution:

It is important to work with certified and qualified Wi-Fi engineers to design your WLAN. Experienced engineers take the time to listen and understand your criteria for success. An enterprise-level design should include upfront assessments and an on-site visit to determine the challenges within your learning environments. Wi-Fi design is becoming more complex with increased usability. Generic product features can't replace skilled engineers. Project management, network assessment, design, engineering, installation, activation, validation, site survey, and heat mapping services guarantee that your network will meet and exceed your end users' expectations.

Piecemeal Wi-Fi networks comprised of equipment, applications, and resources from a variety of vendors

Challenge:

Adopting a piecemeal approach when designing and building your own Wi-Fi network may save you some money initially, but it can quickly become problematic and expensive when something goes wrong. If different vendors are involved, finger-pointing may occur regarding the source of a problem with no single vendor claiming accountability or—even worse—offering a solution. Hiring a third-party to assess and repair the problem is a common and, unfortunately, costly occurrence with these types of hybrid Wi-Fi networks.

Solution:

With WaaS, one vendor manages the entire network. If something goes wrong, the service provider identifies and fixes the problem—no finger-pointing, no headaches, and no additional repair fees.

Poor coverage areas

Challenge:

Often times network users within a WLAN experience lost connectivity as they move throughout a building or even an individual classroom. Learning spaces have poor coverage spots that disrupt learning and frustrate students and educators.

Solution: With WaaS, a Wi-Fi network assessment is performed by engineers who visit the customer site to collect facility data, including the building layout and construction materials. They also gather requirements for coverage, capacity, and mobility, and an RF site survey is also performed. This assessment yields an inspection and gap analysis of the existing Wi-Fi network to identify opportunities for performance optimization, coverage improvement, and capacity enhancement to meet customer requirements.

The current Wi-Fi network is designed on 802.11n specifications for wireless LAN communications; the client densities are too large; the 5GHz coverage is poor and high definition video is too taxing on current specifications

Challenge:

Larger channel widths do not improve WLAN efficiency nor are they realistic in multiple AP deployments. Existing 803.11n networks, designed correctly, have tremendous value and don't need to be replaced. Wider channels reallocate existing spectral capacity—they do not improve aggregate capacity. Attempting to augment a coverage-oriented Wi-Fi network to increase capacity and support dense user populations is an appealing approach for organizations looking to minimize workload and expense. However, such an approach should be met with caution as existing constraints of the coverage-oriented network implementation can limit proper high-capacity Wi-Fi network design.

Solution:

Physical and logical design of the wired and wireless network—including network segmentation, security, fault tolerance, load balancing, user authentication, and integration with your local directory service, policy controls, guest access, and radio frequency (RF) engineering—ensures optimal coverage, capacity, and performance of the Wi-Fi network.

Experiencing inefficient Wi-Fi access coverage issues and adding more APs to the network

Challenge:

Although tempting, adding more APs to a network does not always fix coverage issues. A coverage-oriented design often does not factor in other critical variables required to meet performance and capacity needs, such as the following:

- Minimizing co-channel interference
- Providing sufficient spectral capacity, e.g., using collocated radios on different channels
- Client band steering to optimize use of available spectral capacity
- Frequency separation
- Client load balancing between APs based on available airtime and load
- Meeting application bandwidth and latency requirements
- WLAN latency

Solution:

A solid Wi-Fi design and validation should always be performed. WLAN activation offers the configuration of all network equipment in accordance with design specifications. This enables seamless integration with your local

network as well as the go-live network turn-up. Validation is performed to verify correct network operations, including user access, roaming, and a final RF site survey to ensure desired coverage and minimal co-channel interference.

As part of the WaaS solution model, an engineer visits the customer site to configure and activate the customer WLAN. The engineer also validates that the RF coverage matches the WLAN design created by the MSP. WLAN configuration is performed remotely either prior to activation or during activation. Throughput metrics play an important role, as a proper assessment will reveal the WLAN latency factors that are impacting your network and design. Having an end-to-end QoS design is crucial for sustainability and consistency in wireless access.

Inexperienced or Overburdened Technology Staff

Challenge:

Today's school technology staff are experiencing a tremendous increase in workload as a result of increased reliance on digital solutions. Continuous improvement and change within the network components and WLAN engineering often make it difficult to keep up, maintain and manage a robust Wi-Fi network.

Solution:

A managed Wi-Fi service provider enables customers to augment in-house IT staff with industry experts on an ongoing basis for routine maintenance, upgrades, performance optimization, growth, and troubleshooting. Customers have a trusted expert to oversee and manage their network, enabling their technology staffs to shift their focus to higher priority projects.

Lack of visibility into our network

Challenge:

Many schools and sites lack visibility into their Wi-Fi network and would like to be able to substantiate the traffic on the network and evaluate capacity and growth on a daily basis.

Solution:

When selecting a managed Wi-Fi service, it is recommended that you choose a vendor that provides you with comprehensive network visibility. Today's learning environments include multiple users who are using a variety of devices and mobile applications daily. It is important to track who is using your network and for what purposes. Some MSPs can provide online analytics and reports that access data from within Aerohive's AP Hive manager, letting you know exactly what is happening on your Wi-Fi network. Data usage reports and application reports are particularly useful in the overall use of your network.

Insufficient Bandwidth and Infrastructure

Challenge:

Often times a site has an existing Wi-Fi solution in place that may need to be updated for future growth, however, concerns about current bandwidth and infrastructure are seen as barriers to support an upgrade to the current Wi-Fi offering.

Solution:

WaaS solutions are typically designed for mixed-use networks supporting multiple users utilizing many different types of mobile devices, providing each with access to internal, system wide, and web-based applications. MSP Wi-Fi engineers will work with you to assess and design a tailored solution to meet your desired results and allow you to take advantage of the funding and resources available to improve both your infrastructure and Wi-Fi solutions.

Selecting the Right Equipment (APs, Cabling, Switches, and Peripherals)

Challenge:

There are so many equipment providers offering AP and wireless technology equipment. It is difficult to select the right equipment choice for our district.

Solution:

Working with an MSP offering a WaaS solution enables school districts to implement and sustain enterprise-grade Wi-Fi networks and equipment. The MSP will provide the assessment and tailored design that is right for your school, assisting in the selection and installation of enterprise equipment that meets your coverage, capacity and connectivity needs.

Security and User Access

Challenge:

As our user access grows on our mobile network, it is a balancing act for our IT staff to make sure to manage secure access to student and school data, while allowing students, staff and guest users easy, fast and reliable access to the tools and content they need.

Solution:

A WaaS solution allows you to easily design network protocol. The MSP will work with you to design Wi-Fi policies which will provide variable bandwidth and access control to different users based both on their authenticated username and device type. Multiple policy and SSID design options are available which include the ability to provide different access and security based on user or user type and time of day within the same SSID. A fully managed service allows you the ability to work with your MSP to make ongoing configurations changes and policy adjustments as needed.

Student Engagement

You now have all of your devices connected in a secure manner, at fast speeds, and can easily view the activity of your network from any location using cloud based management solutions...if you have followed the guidelines outlaid in this guide of course. Ok I guess that's Wi-Fi pretty much wrapped up...well, not quite. Wi-Fi is offering a unique opportunity for a return on investment never before seen, through information, insight, and applications. The leading WLAN solutions are beginning to leverage their access layer solutions and cloud architectures to provide schools with an increasing amount of value beyond connectivity, and this is a new area to explore with your managed service provider, requiring a conversation outside of speeds and feeds.

When discussing WLAN solutions with your MSP or OEM, the conversation should center on "what value does it offer our digital learning environment?"

Increasingly, WLAN solutions are utilizing their cloud backend to analyze data points collected from the mobile devices connected to your network. These data points, combined with a rich set of API's and applications, allow your school to tap into new insights that can be used for a wide variety of use cases. Now, your Wi-Fi can be used to determine class space utilization through the presence sensing of devices for example, helping to monitor attendance rates or building capacity.

Helping teachers to maintain order in the classroom, some Wi-Fi vendors offer tools to help the teacher manage the devices in the classroom so that devices can be used for research and learning. In-house applications can be created that leverage the Wi-Fi and network connectivity to communicate with your staff or parents based on their location, creating relevant engagement and alternatives to traditional classroom methods.

Wi-Fi as a Service as a total solution offers far more value than connectivity, make sure your provider offerings protect your investment today and into the future.

Summary

With a successful Wi-Fi deployment your mobile learning experience is enriched and supported. As you've seen throughout this guide, there's a lot to think about when planning for mobile connectivity, from speeds and feeds, to security and management. It doesn't have to be painful though. Wi-Fi is increasingly viewed as a utility, and just like electricity and water, you don't want to think about it, you just want it to work. That's why Aerohive and ENA have partnered to deliver best of breed Wi-Fi as a Service connectivity, so that your people can focus on fueling the learning experience, rather than fixing someone's wireless problems. Read below for some of our success stories and contact us to learn more about how we can help transform your connected experience with Wi-Fi as a service.

RESULTS – Customer Use Cases

The Connect ED Initiative

When President Obama announced ConnectED in June 2013, his vision was to connect 99% of America's K–12 students to the Internet via high speed broadband and wireless connections within five years. The FCC and companies such as Apple committed support by collectively pledging to connect more than 20 million students. In October 2014, Apple committed to support 114 schools in 29 states by providing student and teacher devices as well as enterprise grade classroom connections. To help deliver on their commitment, Apple partnered with Aerohive and ENA to deliver an end to end enterprise grade Wi-Fi solution to the selected schools.

Results

Case Study 1:

Arthur Elementary School, Oklahoma City, OK

Arthur Elementary School (Arthur), a participant in Apple's ConnectED initiative, is part of Oklahoma City Public Schools. The district serves approximately 43,500 students and is the state's largest school system.

As part of the ConnectED program, Arthur received an upgraded Wi-Fi network to support the school's new digital learning initiatives. Aaron Campbell is the school's network assistant engineer, and he is responsible for supporting the school's Apple devices and technology deployment. Despite having a large district IT staff, he was impressed with the extensive assessment and design services that were included with the new wireless solution. "It was a very detailed process," says Campbell. "It was neat to see all of the extensive work that goes into assessing and designing a wireless network for a school. I've never been part of that process or worked with experienced engineers on a project like this before."

The implementation process went very smoothly for the school. Campbell worked with Education Networks of America (ENA), the school's Wi-Fi as a Service (WaaS) solution provider, to make some minor adjustments after everything was in place. "We had a couple of engineers on-site who helped with the activation," says Campbell. "They made sure everything worked like it should. We had an issue pop up, but we worked with ENA to identify the

problem, and together we were able to resolve it very quickly. Working with expert engineers enabled us to make some quick tweaks and adjustments to our original network design to expand our network's coverage."

The school is enjoying their increased connection speeds thanks to the new Aerohive 802.11ac APs they received through the initiative. "We previously had 802.11n APs, so it's nice to have an upgrade," says Campbell. "Our new APs are able to handle the workload more efficiently."

Campbell has enjoyed seeing the response from Arthur's students to the new technology and devices. "It has been phenomenal to witness all of the changes in our classrooms," says Campbell. "Arthur is transforming into a truly mobile learning environment. Our older students are working with our younger students on projects. There is much more collaborative learning taking place since the students received their devices."

Campbell is able to monitor his school's Wi-Fi network with ENA's built-in reporting tools that provide him with enhanced network visibility. "I use ENA Air [ENA's turnkey Wi-Fi solution] reports to track our peak usages," says Campbell. "I can specifically search by AP and see what type of traffic is on the network. A daily bandwidth report is also sent to me, our technology director, and the school's principal. This provides us with some insight into the health of our network and lets us know when we should plan certain bandwidth-intensive events. After we deployed this project, we upgraded our bandwidth to a one gigabit per second connection because our usage skyrocketed."

Arthur has quickly become a model for effective 21st century technology integration within the district. The entire community has embraced the transformation with open arms, and Oklahoma City Public Schools hopes to replicate its success in all of the district's schools.

Case Study Vignette 2:

Cairo Elementary School and Cairo Jr/Sr High School, Cairo, IL

Cairo School District (Cairo), located in Cairo, Illinois, was selected by Apple to participate in its ConnectED initiative. As part of the program, Apple distributed 527 iPads to the district's students and faculty members. To support those iPads, the district also received a brand new enterprise-grade Wi-Fi network. This comprehensive Wi-Fi as a Service (WaaS) solution includes high-performance Aerohive equipment coupled with assessment, design, implementation, and ongoing management services from Education Networks of America (ENA).

Cairo's new, seamless Wi-Fi network is a vast improvement from the district's previous piecemeal approach to Wi-Fi. Doyal Hunter, Cairo's director of technology, was tasked with overseeing his district's previous Wi-Fi network. "We had Wi-Fi in our buildings before the Apple project, but it wasn't district-wide," says Hunter. "I would just place units in various locations depending on demand. The units were not networked together, so the connection would drop as soon as you walked down the hallway. With our new Wi-Fi service, students and teachers can access the Internet anywhere in the building."

The move to a managed Wi-Fi service has enabled Hunter to shift his focus to supporting and enhancing his district's 21st century classrooms. "I used to walk around both of our schools with my phone several times a week to verify that the Wi-Fi was working properly. I don't have to do that anymore with the new managed service. Now I can devote more time toward integrating new instructional technologies and supporting our state and local assessment testing platforms."

Hunter was impressed with ENA's overall Wi-Fi assessment, design, and implementation process. "The engineers did a good job," says Hunter. "It was not a very demanding process on my end. The Wi-Fi survey tool was very cool. I

had an idea of our coverage needs based on the construction of our facilities, but it was nice to have that confirmed by the heat map results."

Aerohive's state-of-the-art equipment is providing Cairo's users with a robust and reliable wireless experience. Hunter has seen his district's Wi-Fi usage skyrocket since the new network was installed. The solution's equipment and reporting tools enable him to monitor network usage, track peak traffic times, and identify the types of traffic on his network. He can also isolate the network protocol to ensure high performance during special events, such as online testing, professional development conferences, graduations, and specific instructional activities. "Everyone is enjoying the new service, including our administrators," says Hunter. "Our Wi-Fi is not going down like it used to. It's great because I don't have to constantly verify that it's working or restart it. We rolled out the iPads a few months ago, and I'm already seeing positive changes in the classroom."

Because Hunter is the district's primary technology resource, having 24x7x365 access to ENA's Customer Technical Assistance Center (CTAC) has been very beneficial. "I'm a one-man show, so it is nice having someone to call for assistance," says Hunter. "I've received great technical support every time I've called. I've primarily worked with one contact, and he's been great. He's always very patient and helpful. He knows me and understands my district's challenges and needs, which I appreciate."

Cairo is looking forward to the next chapter in its digital transformation story and seeing the positive results produced from this exciting initiative.

Idaho State Wide Wi-Fi Deployment

The Idaho State Department of Education launched a statewide funding opportunity in 2013 to provide enterprise wireless internet access to every high school in Idaho. ENA was selected as the solution provider for a managed service to provide uninterrupted, high speed wireless internet access in public schools in Idaho. ENA and Aerohive have worked together to deliver enterprise grade Wi-Fi solutions to high schools throughout the state of Idaho.

Results

Case Study Vignette 3:

Wilder School District, Wilder, ID

Idaho's Wilder School District (Wilder) is undergoing a significant digital transformation. Wilder's Superintendent Jeff Dillon has made personalized learning the goal, and he is using technology as a means of differentiating the instructional experience for every single student. The Apple ConnectED initiative has enabled Dillon to jump-start his initiative through the provision of student and teacher devices, professional development, structural broadband upgrades, and an enterprise-grade Wi-Fi network.

To say Superintendent Dillon is excited about these new opportunities would be an understatement. "Our learning environments immediately changed when we distributed the iPads," says Dillon. "Our kindergartners recently created a movie about the life cycle of a frog using their iPads. Our students are learning how to use all types of digital applications and resources to personalize their learning. We want to move toward a mastery-based system of education where students move through school based on subject knowledge rather than age or grade level. The devices will enable our students to learn at their own pace." The devices are just the beginning for this ambitious school district. In the near future, Wilder plans to introduce several new academic programs, including a 3D lab, an animation studio, and a drone-based community agriculture project.

To support these initiatives, Dillon emphasizes the importance of having a robust and reliable infrastructure in place. "At our elementary school, we just had three APs for the entire building," says Dillon. "It was horrible because

students were constantly getting kicked off of the network, and they could only access the Internet at certain locations in the building." As part of Apple's initiative, Wilder received a new Wi-Fi network that included Aerohive equipment as well as assessment, design, implementation, and ongoing management services from Education Networks of America (ENA). "Now, our network just works, which is how it should be," says Dillon. "This type of access promotes empowerment among both our students and teachers."

Dillon was impressed with ENA's thorough Wi-Fi as a service (WaaS) solution, as it identified some infrastructure weaknesses. "After the new APs were installed, we quickly determined that we needed to upgrade our fiber," says Dillon. "We'd previously had some connectivity issues, but we attributed those to our old APs. The installation of the new Wi-Fi network helped us clarify some things."

Wilder's students also now have home Internet access on their devices thanks to a grant the district received. "You have to create a fiscal plan," shares Dillon. "The Apple program is an amazing opportunity, and we are grateful to be a selected recipient. However, we had a plan in place to purchase devices for our students and upgrade our Wi-Fi network. It's all about the leadership, having a plan, and making it happen!"

Wilder's students are thrilled about the exciting new changes and are looking forward to all of the new learning opportunities they'll get to experience in the future.

About Aerohive

Aerohive delivers Cloud Networking that transforms the Connected Experience.

Our open mobility platform uses the power of Cloud Networking to simplify operations and deliver customized applications and insights for increased IT and curriculum value, built on a foundation of the most scalable Wi-Fi.

Applications and Insights - *Unlock new information, insights, and engagement.*

Customized academic & IT apps for personalized staff, student, and visitor access and engagement, increased productivity, and efficiency, and ultimately fueling a better learning experience.

Enterprise Cloud Networking - *Reduce the complexity of supporting thousands of devices.*

Public or private cloud networking that simplifies management through streamlined deployments, comprehensive visibility and control, and smarter, intuitive troubleshooting.

Great Wi-Fi - *Fast, secure, and scalable connectivity with unique distributed control architecture.*

Increase speed, eliminate points of failure in the network, provide access to only those who should have it, and enable scalability from one access point, to thousands with a single architecture.

Aerohive Networks enables our customers to simply and confidently connect to the information, applications, and insights they need to deliver a superior learning experience. Our simple, scalable, and secure platform delivers mobility without limitations. For our education customers worldwide, **every AP is a starting point**.
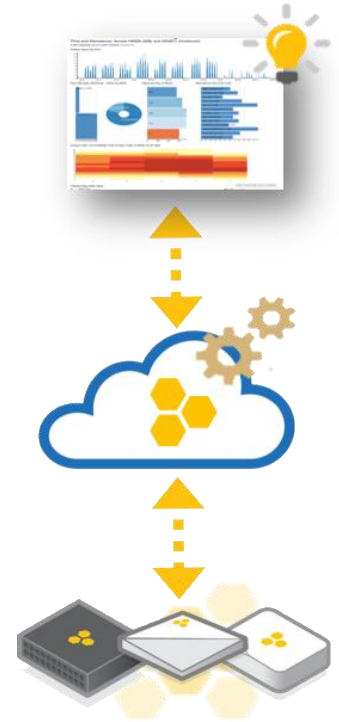
About ENA

Education Networks of America® (ENA) is the leading provider of managed Infrastructure as a Service (IaaS) solutions to K–12 schools and libraries. In 1996, ENA created one of the first statewide K–12 networks in the U.S. and has earned a reputation as experts in the design, deployment, and management of broadband, Wi-Fi/LAN, communication, and cloud solutions.

Today, ENA manages multiple statewide and district-wide networks, including 16 of the largest school systems in the country, successfully serving approximately 5,000 sites; 570 school districts; 3.2 million students, educators, and administrators; 280 libraries; and 3.2 million librarians and patrons.

ENA has partnered with Aerohive to offer a suite of turnkey Wi-Fi solutions for schools and libraries at any stage of a Wi-Fi deployment. Together we have helped hundreds of school districts and libraries across the nation access information, enhance their communications and collaboration, cut costs, and begin realizing the promises of 21st-century learning environments with exemplary Wi-Fi solutions.