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Next Generation WLAN Technology for School Networks



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The Fundamental Problems of Wireless Networking for K-12 Schools

Many K-12 schools around the country have been struggling to build and maintain wireless networks that can provide truly reliable and high-performance Wi-Fi and Internet connectivity for mobile devices and wireless applications. Rapidly increasing demand for wireless connectivity among students, faculty, and staff has put huge strain on existing networks and driven investment in new solutions designed to solve the problems of meeting ever-growing technology needs.

But, until recently, best-in-class wireless networking solutions were often beyond the budgets of schools, which must balance technology needs against many other important areas where funding is required. And, even for those that could invest in wireless networking that was previously at the forefront of technology, many schools have suffered from network bottlenecks, service outages, and slow performance. This is because newer computers, mobile devices, and software applications now require much greater bandwidth and data capacity than previous wireless networking solutions were engineered to support.

Adding further complication is the phenomenon of bring-your-own-device or BYOD. Many members of campus communities are now bringing multiple wireless devices to school every day, including smartphones, tablets, and laptop computers. And many of the best and most innovative educational applications and resources are now designed to connect with and use

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these devices, but the strain of so many devices and interconnected applications, including streaming multimedia resources, has often been too much for most wireless solutions to handle.

More challenges have emerged as schools face a greater need to see and monitor the software applications that are allowed to operate on their networks. In particular, many schools now need to limit access to social media and bandwidth-intensive apps and websites such as YouTube, not only due to the strain that these can place on their networks but in order to ensure appropriate use of online resources. And federal CIPA and E-rate funding requirements have also pushed many schools to filter and block inappropriate websites.

So is there anything that schools can truly do to avoid the problems headaches of wireless networking? Is there a way to build a safe and secure wireless network that delivers truly exceptional and powerful Wi-Fi without breaking the school budget? Thankfully, the answer is “yes.”

The Next Generation Solution for Affordable, High-performance Wireless

Recent improvements and innovations in wireless networking now provide the opportunity for schools to get the same networking power and reliability of enterprise-class wireless designed for major businesses, but simplified and priced for private schools. The technology behind these developments is called wireless next generation or WiNG. This WiNG WLAN technology was pioneered by Zebra Technologies, a co-founder of the 802.11 wireless protocol, owner of over 2,800 patents in wireless, and a global leader in WLAN.

Zebra recognized that there were fundamental problems with wireless architecture and how it has been traditionally designed and deployed, leading to problems with limited mobility, network bottlenecks, a lack of scalability, single points of failure, and vulnerable security. So the company designed and built an entirely new approach to WLAN from the ground up. This approach has eliminated the problems of standalone and centralized hub-and-spoke networks, replacing them with distributed network intelligence that eliminates the need for central controllers and uses intelligent access points to create a “fully network aware” solution. This solution is dramatically more robust and higher performing than alternative solutions and delivers record-setting throughput that has been documented by the Guinness Book of World Records with 84 simultaneous video streams delivered through a single radio access point. And WiNG technology does this all in a way that is vastly more affordable than competing solutions, with a simplified graphical user interface that makes installing and managing networks as fast and as simple as possible for K-12 schools.

WiNG WLAN Overview

High-performance Wireless LAN for Schools	Scalable, and Easy to Install and Manage	Security and Control
<ul style="list-style-type: none">• Campus-wide high-speed Wi-Fi and communications• Meets growing needs and demand at minimal cost• Vastly faster and more reliable than conventional networks• Connectivity and mobility for students, staff, and guests• High bandwidth available indoors and outdoors• No slow-downs, bottlenecks, or service outages	<ul style="list-style-type: none">• Self-healing and self-optimizing network• Automatic traffic routing for best performance• Scalable for your current and future needs• Fast and easy to install, configure, and maintain• Remote monitoring, testing, and troubleshooting• No specialized resources or knowledge required	<ul style="list-style-type: none">• Comprehensive best-in-class wireless security• Tiered approach protects and secures every point in the network• Role-based firewall that protects against attacks and unauthorized access• Advanced encryption and authentication technologies• Virtual LANs (VLANs) to separate student and teacher assets and connections.• Role-based differentiated access for students, staff, faculty, and guests• Wi-Fi locationing technology for school asset tracking• Application visibility and control of inappropriate websites

A Smarter Network with Intelligent Access Points

The intelligent access points used in WiNG WLAN technology means that the network is self-aware, self-optimizing, and self-healing. The access points work together to automatically deliver seamless and reliable coverage and connections for all users, provide secure authentication and data encryption, and automatically route network traffic along the best pathways for fast and reliable service, including the low latency that is required for voice and video. With this distributed intelligence and multiple access points, the network can automatically adjust to sudden increases in demand or even temporary issues with a particular access point and re-route traffic accordingly. Thus, there are no bottlenecks or slowdowns, and there are never any service outages. The networks reacts on its own to ensure that service is always available and that users experience no disruptions or inconveniences.

Additional Features of WiNG Intelligent Access Points

- L2/L3 stateful firewall
- QOS – WMM-PS/SIP CAC
- Mobility – L2 and L3 roaming
- Native IDS/IPS
- AAA Server for site survivable networks*
- DHCP Server, with caching*
- Dynamic RF Management with Smart RF
- Traffic Load-balancing with rate limiting and bandwidth management
- Locally managed firmware updates and configurations
- Local troubleshooting capabilities with statistics aggregation

* = typically separate servers/appliances

Outstanding Network Resilience and Reliability

WiNG WLAN's features SmartRF intelligence that adapts to network demand and device needs in real time. This way, students, faculty, and staff can enjoy seamless and reliable service at all times. Access points automatically calibrate power and channels, increasing power for weak devices—even as smartphones, tablets, or laptops move through your school. And intelligent access points also dynamically re-configure the network to avoid interference from other electronic devices or equipment. WiNG access points will also recover neighboring access points if a network issue arises, and they automatically apply smart band control and will balance network load to ensure that your users are getting the best performance.

Unmatched Network Assurance and Troubleshooting

WiNG network is self-healing and self-optimizing, but some issues may require troubleshooting of end user devices. For any temporary issues with particular access points, end user devices or aspects of network performance, WiNG WLAN offers centralized troubleshooting that can be used to resolve 70% of wireless issues via remote management. With performance alarms and reports, WiNG delivers proactive prevention to help you address issues before they affect users. And an end-user feedback capability allows users to report a problem if they experience one, providing critical information for both historical and real-time troubleshooting.

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WiNG WLAN also offers end-to-end network testing, allowing you to test connectivity, verify access to wireless applications and servers, and proactively perform network tests remotely. This allows you to find and remediate potential problems before members of your campus community are impacted. You can classify network issues, identify the source of a problem, and verify remediation without local support. So, even if there is an issue with an access point in a particular building or location on your campus, you can identify it and address it remotely.

With a fully network aware WLAN in combination with these centralized features for proactive troubleshooting and network assurance, WiNG helps you improve wireless availability and reduce network downtime for problem-solving and maintenance. This not only makes life easier when it comes to handling IT responsibilities, but it ultimately reduces the time and operational costs associated with wireless performance and maintenance.

Powerful Security for Campus Communities

Wireless networking for private school campuses presents unique challenges for security, with the need to protect privacy and sensitive information and prevent hacking and rogue connections while delivering reliable service for students, faculty, staff, and visitors. WiNG WLAN features a multi-tiered security suite that protects every point in your network. A role-based firewall, comprehensive encryption, and secure authentication ensure that you get comprehensive protection at the very edge of your network. This prevents and eliminates rogue device connections and provides intrusion prevention to protect against more than 250 distinct threat types.

Importantly, WiNG WLAN allows role-based differentiation of access for students, faculty, staff, and guests, and you can create virtual LANs (VLANs) to separate student and teacher assets and connections. Thus, connections and access to sensitive information and school assets can be restricted and controlled according to the type of user and specific roles within your school. And WiNG also includes configurable blocking of inappropriate websites.

Next generation wireless networking can also be combined with radio frequency ID (RFID) tagging and barcoding to track and monitor school assets such as laptops, tablets, library books, electronic equipment, and even office equipment and furniture. This is ideal for theft prevention and also for reducing storage requirements and quickly locating assets wherever they are and whenever they are needed.

Analytics and Forensics

For real-time monitoring of network activity and for forensic analysis of trends, performance, and connectivity, WiNG WLAN also includes NSight software. NSight is an incredibly simple and easy-to-use graphical interface for viewing minute-by-minute stats, traffic, signal and location trends, and device connections, threats, and associations. With adjustable time windows and historical location tracking, you can view a complete record of wireless performance and connectivity. These capabilities make it fast and easy to analyze network activity for security, and troubleshooting. This allows you to better understand and monitor the performance of your network and quickly determine the root causes of any concerns or issues and identify the steps to address them.

A Safer, Smarter, More Efficient Campus

WiNG technology delivers record-setting performance while creating virtually limitless opportunities to add or enhance campus security and services that help your school deliver outstanding educational outcomes, strengthen relationships with students and parents, and give your school a competitive edge in attracting and driving enrollment.

Your network can be integrated with smart ID cards, RFID technology, and handheld computers to create a smarter, safer, and more efficient campus. You can maximize campus security, provide seamless transactions and cashless payments, improve the productivity of faculty and staff, protect access to all of your assets and resources, track attendance and last-known locations for safety, and even document and access student allergies, special requirements, and emergency contacts.

Here are just some of the ways that private schools have already been integrating WiNG WLAN with a comprehensive strategy to create the ideal all-wireless campus.

Potential Applications of WiNG WLAN:

- Anytime and anywhere voice and data access
- Real-time faculty and administrative applications
- Smart ID cards and wristbands
- Cashless payments and wireless transactions
- Automated attendance recording and tracking
- Voice over WLAN (VoWLAN)
- Emergency planning and communications
- Video surveillance and monitoring
- Use of the 4.9 GHz public safety band for school security and video
- Distance learning connectivity and applications
- Automated asset tracking
- Live streaming of school events
- Outdoor campus coverage

For more information and details about strategies for building an ideal wireless campus, please download our companion piece entitled, ***“Building the Ideal Wireless Campus.”***

How to Get Started: Free Consultation

At AB&R (American Barcode & RFID), we have been serving schools and businesses for 35 years, delivering the latest technology solutions and insights to meet ever-growing needs for greater connectivity, security, efficiency, and cost-effectiveness. In partnership with Zebra, a world leader in wireless networking, ID card solutions, and barcoding and RFID tracking, we would like to offer you free expert technology consultation. We can help you assess your school's wireless networking and other technology needs and evaluate your best options in making your campus safer, smarter, more connected, and more efficient.

Contact us today to schedule a call or set up an appointment at your earliest convenience.

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