

# Building the Ideal Wireless Campus

Empowering Students and Faculty with Reliable, High-Speed WLAN



# Meeting the Growing Need for Wireless Connectivity

More than ever, colleges and universities must leverage the power of the Internet and the digital classroom to enrich learning experiences and deliver outstanding educational outcomes. Today's higher education students have grown up in a wireless world, expecting 'anywhere, anytime' access to the information they need, on any device—including laptops, smartphones, and tablets. Students now rate wireless access among their top priorities when selecting a college, and a failure to meet expectations can have a negative impact on student enrollment and retention.

Faculty also need reliable, high-speed Internet access to deliver streaming multimedia content, integrate the latest technologies into their curriculum, deliver courses online, and use learning management systems (LMS) to share course materials, assignments, and grades. Schools must also adopt the latest wireless technologies and software applications to deliver better student services, streamline their operations, and achieve greater cost efficiency. Furthermore, safety concerns are driving additional wireless connectivity demands for video surveillance, emergency response, and crisis notification systems.

Unfortunately, wireless demand has pushed most wireless networks beyond their limit. New applications and bandwidth requirements have exceeded the capabilities of existing wireless local area network (WLAN) technologies, and this shift has occurred faster than many wireless technology developers expected. The sudden explosion in the number of mobile devices and wireless hardware and software applications has outstripped the growth that was anticipated by users and developers alike.

Thankfully, colleges and universities do not need to suffer the consequences of unanticipated growth in wireless demand. Schools can now meet today's wireless capacity and performance needs by switching to next generation WLAN, designed to meet both current and future wireless connectivity demands. This scalable technology delivers unprecedented wireless throughput, reliability, and performance at a cost that will not break your campus IT budget.

At Aerco Wireless, we have been recommending and installing next generation WLAN for our higher education clients and customers across many industries, and it is delivering phenomenal results. In this guide to Building the Ideal Wireless Campus, we provide an overview of next generation wireless, including its advantages over previous networking technologies and its many potential applications throughout your campus. And perhaps most importantly, we explain how your institution can upgrade to this proven WLAN technology at up to 50% lower cost than other solutions.

## Next Generation WLAN

### Affordable, High-Performance Wi-Fi™ for Higher Education

Over the past few years, significant advancements have been made in WLAN architecture and Wi-Fi technology. In order to support the new high data rates of 802.11ac, the underlying WLAN architecture had to change, moving away from traditional hub-and-spoke network configurations to distributed network intelligence. Previously, wireless networks were engineered with expensive central controllers serving as hubs and lightweight wireless access points serving as spokes to deliver wireless access and coverage where it is needed.

Hub-and-spoke architectures were good in their day, but as Wi-Fi data usage soared and connectivity was needed for faster mobile devices and bandwidth-hungry applications, the centralized architecture approach became obsolete. With all traffic flowing through central controllers, these architectures inevitably cause bottlenecks, slowdowns, and network failures as they create single points of failure.

Centralized controllers also carried the burden of network intelligence, security, and monitoring, which means that networks are unable to adapt and respond optimally to changing traffic flows and patterns. It also means they are unable to quickly and automatically compensate for sudden issues at particular access points or prevent security threats at the edge of the network. Ultimately, a failure at the controller can mean a range of potential problems or even a full-scale outage for the network.

These issues called for a new approach to WLAN infrastructure; fortunately, one company stepped forward with a solution that addresses all of these problems while delivering high-speed, high-capacity wireless that never fails. Our partners at Zebra Technologies created a vastly more efficient and high-performing network architecture in the form of wireless next generation (WiNG) WLAN.

Zebra is a global leader in wireless networking, mobility, location tracking, and printing. Founded in 1969, the company has a rich history in wireless technology as co-author of the 802.11 wireless standard, co-founder of the Wi-Fi Alliance, and owner of over 350 WLAN patents. Its introduction of WiNG WLAN has now revolutionized wireless connectivity, reliability, and performance.

WiNG uses the latest 802.11ac wireless standard and replaces hub-and-spoke architecture with distributed intelligence and a network that is self-optimizing and self-healing. The end result is a self-aware WLAN that distributes intelligence and security among all its access points, allowing them to work together to automatically route traffic along the best pathways, re-route traffic when needed, and achieve record-setting wireless performance and reliability. As a testament to its high-capacity network throughput, Zebra has earned the official Guinness Book of World Records' mark with 84 simultaneous video streams delivered through a single wireless access point. Multiplied across a network with multiple access points, the capacity and reliability of WiNG networks is unmatched in the WLAN industry.



## Benefits of Zebra WiNG WLAN

- Campus-wide high-speed Wi-Fi for high density data, video, and voice
- Distributed network intelligence for ultra-fast, reliable performance
- No bottlenecks, slowdowns, or service outages
- High-capacity bandwidth available indoors or outdoors
- Connectivity and mobility for dense user environments for students, faculty, staff, and guests
- Technology to meet growing needs and demand at a huge savings
- Scalable for future demand and expansion
- Highly secure with advanced encryption and authentication
- Fast and easy to install, configure, and maintain
- Reduced capital expense with up to 50% lower installation costs

## Security and Control

- Comprehensive best-in-class wireless security
- Tiered approach to protect and secure every point in your network
- Role-based firewall on every AP that protects against attacks and unauthorized access
- Advanced data protection and user verification technologies
- Role-based differentiated access for students, staff, faculty, and guests
- Configurable blocking of inappropriate websites
- Application Visibility and Control at the AP
- Wi-Fi locationing technology for school asset management and tracking
- Supports RFID for additional security, tracking, and service capabilities

The distributed architecture of WiNG 5 WLAN eliminates network slowdowns and service outages, ensuring that your network is always up and running and that your campus community is always connected. WiNG delivers reliable, high-speed wireless data, video, and voice inside your buildings and throughout your campus grounds. It can easily scale to support hundreds of remote sites, providing a consistent user experience—from classroom to dorm room, to café or lecture hall, at the primary campus or a small remote site—all managed with centralized management by your IT staff or outsourced through our third-party services.

As an added benefit, WiNG eliminates the need for expensive controllers, which dramatically reduces the cost of upgrading your network. By implementing the superior technology of WiNG wireless, colleges and universities can achieve up to 50% savings on their installation costs. Also, WiNG offers a simplified user interface and zero-touch installation that make it inexpensive and remarkably easy to install, maintain, and administer. The bottom line is a world-class wireless network that meets any level of demand without breaking your campus IT budget.

You can support all the wireless computers and devices on your campus and support applications and technologies that greatly improve your learning environment, campus security, and the overall productivity of your faculty and staff.



## Key Considerations for Colleges and Universities

### Seamless Mobility

Zebra WiNG technology is engineered for the most challenging and dense user environments. Whether you need indoor or complete campus coverage, enterprise-grade 802.11ac access points offer unwavering connectivity—from classrooms to auditoriums and dorm rooms, as well as outdoor courtyards, stadiums and open spaces. With WiNG WLAN, roaming is seamless, connectivity is reliable and secure, and network congestion is never an issue. Application-aware access points and deep packet inspection ensure high-quality voice, data, and video streaming at all times.

### Affordable Technology

With Zebra's 802.11ac wall plate access points, you can leverage existing classroom cabling to deploy a wireless network in minutes, translating into significant savings. You can also cut costs with virtual controller technology that allows you to build out a 64-access-point wireless network with no controller appliance and no AP licenses with full WiNG functionality. The result is higher performance and reliability at a lower cost.

## Easier Management

Next generation wireless helps you get the most out of your IT staff and budgets. With wireless technology designed to do more with less, you get the benefits of zero-touch deployments and simple, but powerful management and network analytics. WiNG makes it easy to manage mobile applications, allowing you to preserve both wireless and wireline capacity so you can prioritize critical applications such as online testing. Centralized management, monitoring, and provisioning through a simple graphical user interface means IT staff can do what they need without leaving their desk, while distributed intelligence ensures no single point of failure disrupts service. Remote management, automation, and self-management enable IT staff to focus on being proactive rather than reactive.

## Simple Scalability

Colleges and universities can deploy and scale WiNG WLAN easily with a unified architecture and management that can grow from a single access point to 25,000 access points as your campus needs demand. Since the same operating system resides across the entire Zebra Wireless LAN, management remains simple—regardless of the size of your network.



## Better Network Assurance, Analytics, and Management

### NSight Network Management

Zebra NSight is a powerful, feature-rich management module which greatly simplifies network assurance, monitoring, troubleshooting, and reporting. With NSight, Zebra offers simplicity in management that is distributed across your entire network and viewable from a single vantage point. It provides you with the ability to build customized, role-based dashboards for every IT role at your institution, such as helpdesk personnel, network administrators, and CIO or CTO. These dashboard views can be tailored for different decision makers, presenting each with relevant information to assist in executing the best action for your network. Zebra NSight provides users with the unique, multi-dimensional capability to monitor and report based on time, network analytics, and user role, which can carry your investment far into the future.

Zebra NSight redefines the way IT administrators manage their network by providing real-time visibility and in-depth insight into every dimension of the network, including visibility into layer-7 applications, client devices, users, and the types of operating systems and devices being utilized. At a glance, the administrator can discern the top applications by usage or by count at every level of the network. You can also prioritize applications on the network, prevent non-productive applications, and enforce policies with WiNG's firewall and quality of service (QoS) policies, which can leverage the application context.

Debugging and troubleshooting tools can be accessed through the NSight browser interface, including packet capture, wireless debug log access, and TCP/IP ping and trace route. You can also obtain a summary of all events related to a particular device with appropriate filters applied. Moreover, you can create custom dashboard interfaces on the fly to monitor the network in real time and share all crucial parameters of an access point or client under suspicion.

Zebra NSight provides a view of device health, bandwidth usage, application usage and more—offering a basis for monitoring and analyzing the most complex scenarios. NSight also makes it easy for IT professionals to compare current usage patterns to historic trends to better plan for future growth.

The AirDefense platform also offers historical data capabilities that include detailed forensics. It provides real-time network visibility and powerful management tools such as remote monitoring and testing, performance and intrusion alarming, centralized live network view, spectrum analysis, and many more.

Zebra RadioShare technology improves the network assurance cost-to-performance ratio for WLAN networks. RadioShare allows a radio on the AP to perform double duty. It not only handles clients, but also acts as a sensor for applications that typically do not require full time sensors. This minimizes the need—and cost—of having separate APs, supporting Power-over-Ethernet (PoE), while at the same time increasing network functionality and monitoring.

When RadioShare is enabled, the continuous stream of data collected by infrastructure radios is passed to the network assurance software module for processing and for accessing a powerful management toolset that includes remote, real-time, and historical troubleshooting, spectrum analysis, forensics, and testing. RadioShare software works at the AP level, improving efficiency while eliminating the need for—and expense of—deploying a separate sensor network or purchasing APs with extra radios dedicated solely to these management and troubleshooting tasks.

## Elements of the Ideal Wireless Campus

From high-speed Wi-Fi, multimedia resources, and learning management systems to ID card security, cashless payments, and asset management, you can leverage a high-performance WiNG wireless network to create an all-wireless campus that is a model of educational innovation.

Your network can be integrated with ID cards, radio frequency ID (RFID) technology, and handheld computers and scanners to create a smarter, safer, and more efficient campus. This not only solves many of the technology challenges that your school may face, but also helps your campus deliver outstanding educational outcomes and services that will give it a competitive edge in attracting the best and brightest students, faculty, and staff.

WiNG technology creates virtually limitless opportunities for security and services that meet the expectations of today's students, empower your faculty and staff, and position your institution as a technology leader.

The following are some of the many potential applications for next generation wireless on your campus.

### Anytime, Anywhere Voice and Data Access

The ability to deliver truly resilient wireless voice and data services to every corner of your campus serves the needs of the student body as well as your faculty and staff. You can provide anytime, anywhere access to grades, learning portals, and student services as well as voice-over-IP and video, meeting the demands of everyone on your campus. With the bandwidth and reliability to support any wireless device, deliver multimedia content, and empower today's digital classrooms, your faculty has the tools to deliver an enriched learning experience and achieve maximum productivity. You can even extend wireless access to guests without compromising your network security with partitioned access for authorized visitors, parents, and guests.

## The Importance of the 802.11ac Standard

Upgrading to the new 802.11ac standard is critical to supporting the latest mobile devices, computers, and software applications in higher education. 802.11ac has greatly expanded available bandwidth and network throughput, and it enables phenomenal gigabit speeds while giving colleges and universities greater control over the applications and devices that can access and use their networks.

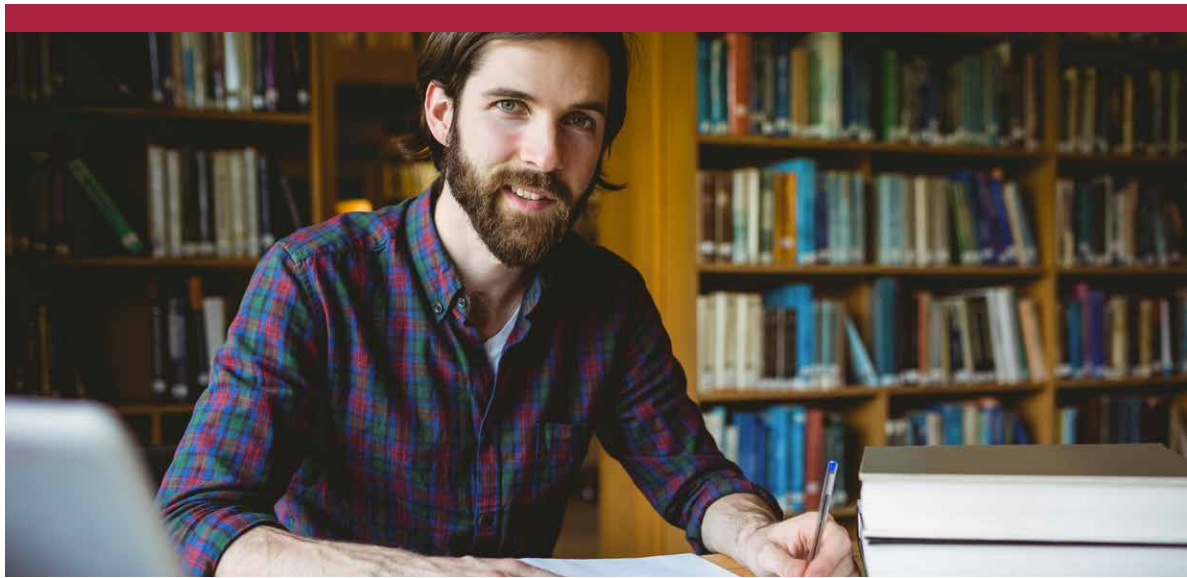
New 802.11ac wireless networks can also support older devices and equipment with backwards compatibility to previous wireless standards. This, along with a trade-in program from Zebra, means you can upgrade all of your legacy standard devices to the latest 802.11ac wireless technologies at a savings to your school.

## Real-Time Faculty and Administrative Applications

A wireless network can provide a wealth of applications that help faculty spend more time teaching and less time on administrative tasks, thus, improving the overall quality of education. Reliable, high-speed wireless means your faculty and staff can access important administrative applications, student information, and educational resources from anywhere on campus. This allows your faculty and staff to be productive and efficient wherever they are and delivers mobility that empowers them to take learning experiences beyond the classroom.

Powered by your network, wireless attendance applications can eliminate paper forms, save time, and eliminate errors while rapidly identifying missing students. Wireless software applications can also be used for seamless and cashless checkouts, payments, and reservations in your library, dining halls, media centers, campus stores, and even at self-service kiosks.

Moreover, the ability to send wireless work orders to maintenance staff and facility management not only improves productivity for your faculty and staff but also enables faster repairs. From a leaky faucet or faulty heating unit to the removal of broken glass in the parking lot, wireless administration can help you maintain a safer and cleaner environment for all.



## ID Cards and Wristbands

Combined with a next generation wireless network, smart ID cards and wristbands allow colleges and universities to make enormous improvements in campus security, emergency planning and response, and student services.

Smart ID cards and wireless networking can be used to extend access controls to particular classrooms, offices, and restricted areas within your campus, granting access only to select members of your faculty, staff, or security personnel. They can also be used to limit access to and verify or monitor attendance at campus events.

By using smart ID cards and the latest software solutions, you can also eliminate manual visitor logs and processes and replace them with automated technology that will help your staff ensure that all visitors are authorized and avoid dangerous and potentially tragic mistakes and oversights.

ID cards and wireless networking can also be used to protect and secure school equipment and resources, such as laptops, tablets, audio/visual equipment, library books, and laboratory equipment by requiring ID scanning and tracking for any checkouts or reservations.

For enhanced security and for emergency planning and crisis management, RFID cards can also be used to track movement, identify current and last locations, and verify presence.

Wherever ID cards or wristbands are used, they can be scanned with handheld computers and devices, including smartphones and tablets, making it easier than ever for faculty, staff, or automated equipment to verify identity, process transactions, and deliver important services. Whether IDs are used in your classrooms, dining and residence halls, libraries, campus stores, or with vending machines, kiosks, or checkout processes, they can save considerable time and lower your school's administrative expenses.

### **Voice Over WLAN (VoWLAN)**

The same wireless network that provides access to the Internet, video, and back-end educational applications can also enable the delivery of wireless voice services. Voice over WLAN (VoWLAN) handsets provide cost-effective connectivity for faculty and administrators throughout campus, effectively eliminating monthly cell phone service fees as well as the need and cost associated with running cabling to classrooms. Smartphone-style handsets provide a virtual and mobile extension of the desk phone, complete with the desk phone feature set. This includes abbreviated 4-digit extension dialing, one-number reach, one voicemail box, call forwarding, conference calling, and more—all without replacing your existing PBX system. This same device can provide push-to-talk private calls and group calls for immediate connectivity, and can even communicate with two-way radios on existing radio systems. With access to email, messaging, the Internet, and mobile-based applications, you can finally have all of your communications converged in a cost-effective mobile device.

### **Emergency Communications**

A WiNG wireless network provides the highly reliable, pervasive backbone required to support a broad range of emergency communications. An email or text message can be sent to any wireless device on your network, or even off-campus, at high speeds and with total reliability. Also beneficial is the ability to reach all faculty and administrators simultaneously through a group push-to-talk walkie-talkie style call to VoWLAN handsets, which allows administrators, campus security, and other staff to rapidly 'spread the word' during emergencies.

### **Video Surveillance**

The ability to wirelessly connect video cameras, both indoors and outdoors, eliminates the high cost of wiring and allows colleges and universities to blanket the campus with video cameras. The result is real-time streaming video, providing visibility into every inch of the campus and enabling security personnel to immediately discover and respond to virtually any type of on-campus incident. The digital video is easy to archive and retrieve, the sophisticated analytics proactively identify potential problems, and the wireless network allows personnel anywhere on campus to watch the video.

### **e-Citations and Automatic License Plate Recognition**

Mobility allows campus police to carry a mobile handheld computer that provides access to student information as well as the ability to electronically issue a citation. Now, campus police can quickly verify vehicle stickers and check for any other outstanding citations—for example, to help identify a repeat offender who parks in areas designated for faculty or emergency vehicles. Auto-fill fields, drop-down menus, and checkboxes ensure citation accuracy.

Additionally, the ability to deploy a cost-effective automatic license-plate recognition (ALPR) solution allows schools to easily and automatically monitor vehicles that are entering the campus. When a vehicle that is wanted or stolen, or associated with outstanding violations enters the grounds, campus police are instantly notified, enabling the swift action required to help better protect students and faculty.

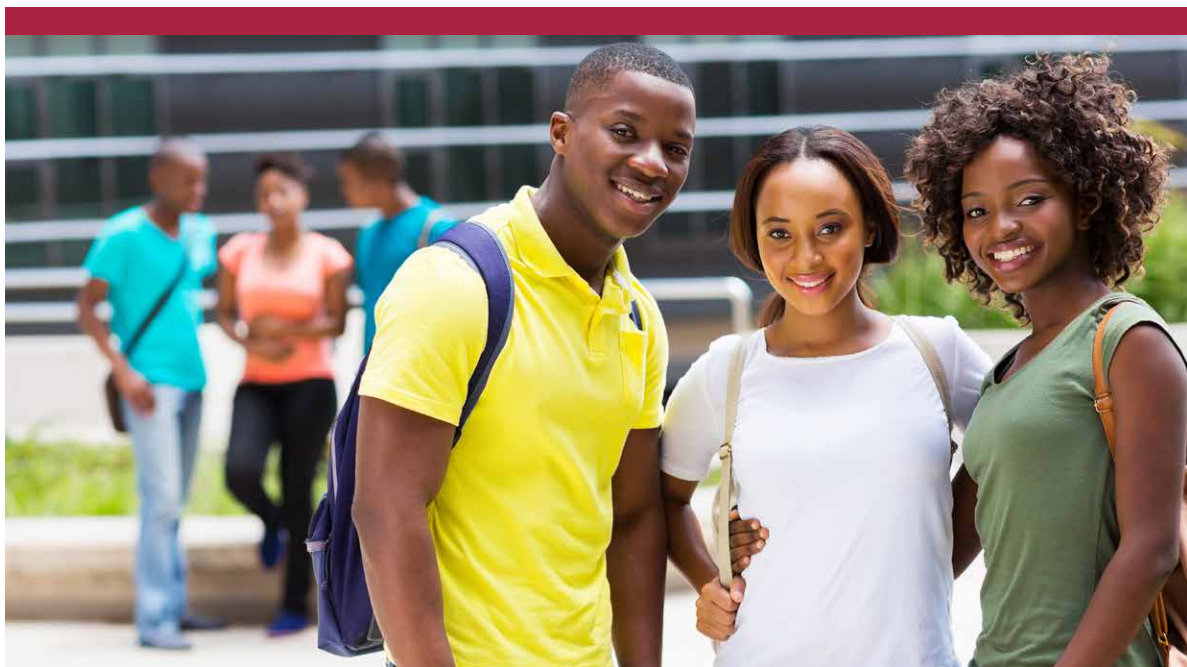


## Automated Asset Tracking

Through Wi-Fi locationing technology and RFID-enabled tags, you can automatically track school assets including laptop computers, tablets, audio/visual or laboratory equipment, IT assets, books, and even office equipment and furniture. Assets can be easily located when needed, potentially reducing inventory requirements and eliminating the effort and costs required for manual barcode scanning or searches. Lost or stolen assets are instantly visible, providing a theft deterrent that protects against equipment loss and negative impact on your budget.

## Live Coverage of Events

Sporting and cultural events are an important aspect of every college or university campus. A high-performance WiNG wireless network allows your school to enable easy and cost-effective viewing of any event, either live or streamed at a later date. A wireless network eliminates the high cost of cabling your venues and supporting hard-to-wire areas, and it provides the flexibility to move press areas as needed, with no need to wire sports facilities that may be hundreds of yards from the nearest campus building.



## Upgrading to Next Generation Wireless

### Wireless Upgrade Offer

From now until December 31, 2016, you can trade in your current wireless networking equipment and get \$20 off each item when you upgrade to next generation WiNG WLAN from Zebra Technologies.

### Trade In and Upgrade Your Wireless Devices

Through the Zebra trade-in program, you can upgrade any of your eligible mobile and touch computers, barcode scanners, RFID readers, and printers. Zebra's cost-saving program means you can upgrade to the high-speed reliability and scalability of WiNG WLAN and also get the benefits of the 802.11ac wireless standard and better connectivity for all of your wireless devices.

## How to Get Started

### Free Expert Consultation from Aercor Wireless

Aercor Wireless is a leader in wireless networking and communications. We specialize in helping clients navigate the ever-changing landscape of wireless technologies and leverage the latest solutions for greater connectivity, performance, and reliability. We offer insights, expertise, and a full range of services designed to help educators and private sector companies solve their toughest Wi-Fi and mobility challenges. From site surveys and design engineering to diagnostics, network assurance, and managed services, we provide scalable and cost-effective solutions that minimize headaches and maximize your return on investment.

### Schedule Your Free Consultation

Contact us today to schedule your free consultation. We would love to help your school!



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