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Q&A: Recommendations for the Latest Wireless School Solutions

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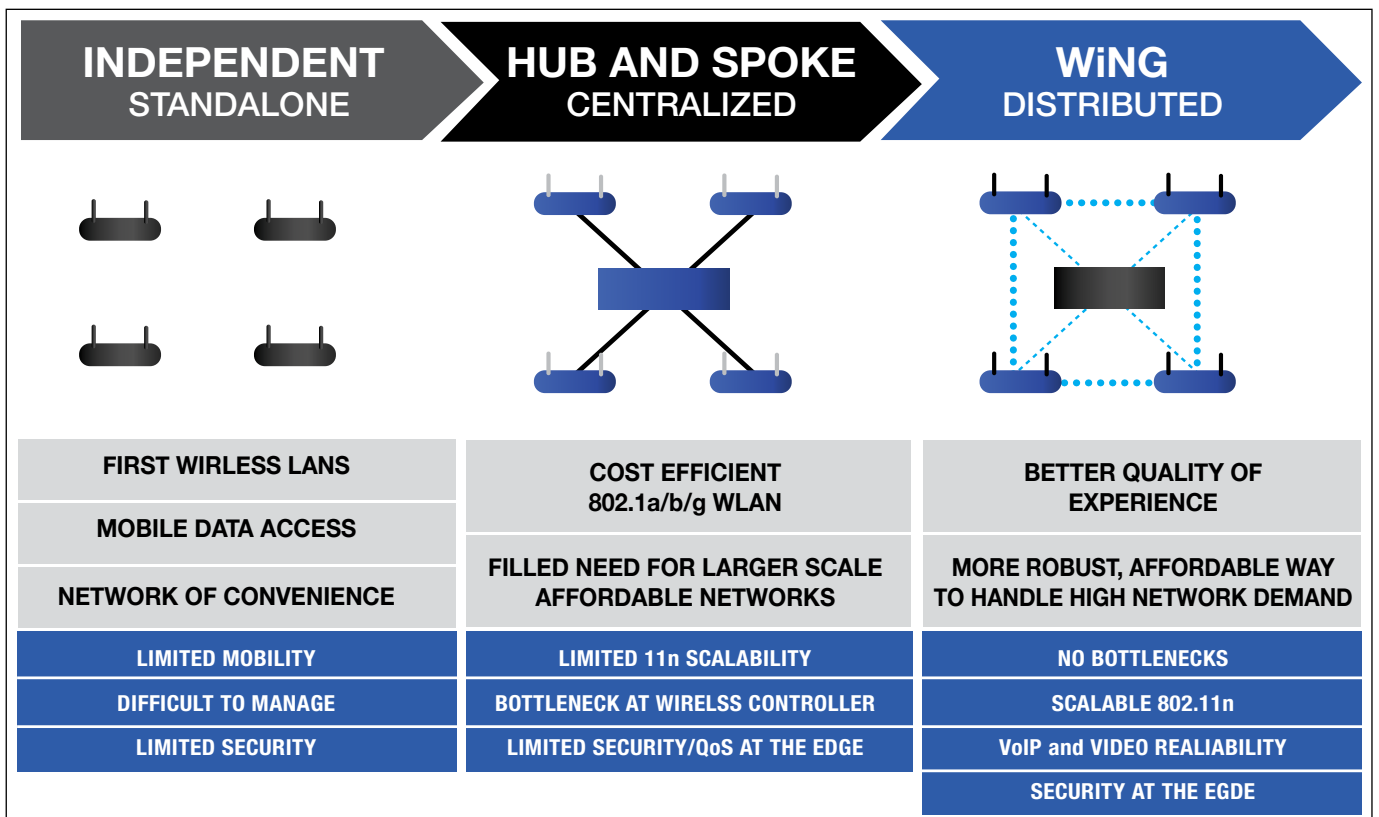
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Q: *Every company and vendor claims that its wireless networking is the best, and it promises better performance than other technologies. But they can't all be right. If you're recommending WLAN solutions, what makes them any different, and how can we be sure that they will perform better than the rest?*

A: It is absolutely true that there are many companies and vendors that make similar claims about the performance and reliability of their WLAN solutions. As technology consultants and WLAN experts, we see this all the time, and customers should definitely be skeptical. When we specify WLAN solutions for our customers, we are very selective, and we make a point of recommending technologies that are proven to achieve the results and backed by real performance metrics and case studies.

Based on our careful review, we recommend WLAN solutions from Zebra Technologies and particularly its WiNG or wireless next generation WLAN. The advantages of WiNG compared to previous WLAN technologies are extensive, and we have detailed technical specs and research that we can share upon request. But the easiest way to understand the fundamental differences between next generation wireless and previous technologies is to consider that WiNG was built from the ground up to address the fundamental problems of wireless networking. It is designed to provide a more powerful, scalable, and affordable solution that not only meets the demands of today's data and bandwidth-intensive applications and devices, but it is designed to grow and expand as your needs and demands increase.

... the latest in wireless performance on any scale, from one to as many as thousands of access points.

The foundation of WiNG involves moving away from independent, standalone WLAN and centralized, hub-and-spoke WLAN to distributed network intelligence and more robust infrastructure. The diagram below shows this evolution in architecture, which is now led by Zebra's WiNG WLAN, which offers record-setting wireless performance with a fully self-aware network and a distributed approach to networking that ensures that there are never any bottlenecks or service outages.

INDEPENDENT STANDALONE	HUB AND SPOKE CENTRALIZED	WiNG DISTRIBUTED
FIRST WIRLESS LANS	COST EFFICIENT 802.1a/b/g WLAN	BETTER QUALITY OF EXPERIENCE
MOBILE DATA ACCESS		
NETWORK OF CONVENIENCE	FILLED NEED FOR LARGER SCALE AFFORDABLE NETWORKS	MORE ROBUST, AFFORDABLE WAY TO HANDLE HIGH NETWORK DEMAND
LIMITED MOBILITY	LIMITED 11n SCALABILITY	NO BOTTLENECKS
DIFFICULT TO MANAGE	BOTTLENECK AT WIRELSS CONTROLLER	SCALABLE 802.11n
LIMITED SECURITY	LIMITED SECURITY/QoS AT THE EDGE	VoIP and VIDEO REALIABILITY
		SECURITY AT THE EGDE

Rather than using a centralized wireless controller to manage and route traffic, which is much more costly and leads to bottlenecks and slow network performance, WiNG's distributed approach puts all of the intelligence and power of a controller into each wireless access point. So each access point is fully self-aware and can configure device connections and route data and communications on its own, and it can work together with other access points to choose the best pathways for maximum efficiency and performance. This ensures high-speed and reliable wireless while it also eliminates the hardware costs and maintenance headaches of centralized hub-and-spoke networks.

WiNG WLAN also offers complete scalability with the latest802.11n and 802.11ac protocols, providing schools with the latest in wireless performance on any scale, from one to as many as thousands of access points. And the speed and throughput of WiNG WLAN is unmatched in the field of wireless networking. The biggest testament to this to date is the fact that Zebra's WiNG technology holds the Guinness Book of World Records mark for wireless throughput with 84 simultaneous video streams delivered through a single radio access point. With multiple access points working together throughout a school campus, your total throughput and performance is limited only by the number of affordable and intelligent access points that you deploy.

WiNG WLAN is achieving this same phenomenal wireless performance and delivering unprecedented reliability in schools around the country, at a fraction of the cost of other solutions. WiNG Express, which offers next generation wireless in a package designed and priced for private schools, includes a simplified user interface and zero-touch installation. This makes it inexpensive and remarkably easy to install, maintain, and administer a world-class wireless network that meets any level of demand.

In fact, with WiNG's network assurance and centralized troubleshooting, administrators can go beyond historical and even real-time troubleshooting to proactive prevention. Performance alarms and reports automatically notify administrators when there is an issue, and the network automatically re-routes and re-optimizes itself to address the problem before it can impact users. Administrators can then use the simple, graphical user interface to locate the source of problems and address them using the network's own tools and intelligence. In fact, 70% of wireless troubleshooting cases with WiNG WLAN can be resolved via remote management, with no need for a physical presence at the access point or source of the problem.

With end-to-end network testing and extensive forensics, administrators can find and remediate problems before users are impacted and review usage trends and network demands to make adjustments and take further preventive action

For more information on WiNG WLAN, check out our summary of features and benefits below, and contact one of our technology consultants with any questions or to request more information.

Summary of WiNG WLAN

- **Campus-wide high-speed Wi-Fi and communications**
- **Technology to meet today's needs and growing demand at minimal cost**
- **Faster, more reliable, and intelligent wireless networking**
- **Connectivity and mobility for students, faculty, staff, and guests**
- **High bandwidth available virtually anywhere, indoors or outdoors**
- **Distributed network intelligence with no centralized controller hardware**
- **No bottlenecks, slowdowns, or service outages**
- **Self-optimizing and self-healing with zero-touch installation**
- **Smart RF for auto-power and channel selection and interference recovery**
- **Simplified graphical user interface for easy management**
- **Highly secure with advanced encryption and authentication**
- **Scalable for your unique school needs and future expansion**
- **Fast and easy to install: deployable in minutes and simple to maintain**
- **Backwards compatible with support for 802.11n, a, b, c, and g**

Q: *What solutions are you currently recommending to secure school wireless networks and prevent hacking and cyberattacks?*

A: Since we specialize in wireless solutions, our focus in data security is on protecting school wireless networks and preventing unauthorized hacking, intrusions, and inappropriate use of bandwidth and access.

For schools, threats come from outside the school and also from within the campus community. With most schools connecting to internal databases or external cloud databases through their networks, they are a clear target for hackers who are looking to steal personal and payment information and ID and password combinations. Unfortunately, incidents of student hacking are also on the rise, with poor network security allowing unauthorized access and database intrusions by students. In a number of incidents, this has led to grades and records being changed for a large number of students and embarrassing arrests and legal issues for student hackers and their families.

With the WLAN solutions that we recommend, security is a top priority...

With the WLAN solutions that we recommend, security is a top priority, and we insist on using technology that offers multi-tiered protection against these types of threats, including security at the very edge of the network. It's simply not enough to rely on basic user authentication and encryption to protect user access and the data that is transmitted through your network. Advanced authentication and encryption must be deployed, and each access point in a network must be fully secured for end-to-end network protection.

Schools should also deploy a role-based firewall to prevent intrusions, attacks, and unauthorized access. And virtual LANs or VLANs should be used to separate student connections and assets from those of school faculty and staff. This can help prevent and mitigate both external and internal hacking. And having an easy-to-use yet sophisticated monitoring and analytics platform is critical for quickly identifying and addressing any unusual or unauthorized activity on your network.

The WiNG WLAN solutions that we recommend, from Zebra Technologies, offer all these protections and many more, including Air Defense network security, unauthorized IP detection, device fingerprinting, anomaly analysis, client blacklisting, and the ability to block inappropriate websites and disable peer-to-peer communications.

Whatever solutions you choose, make sure that you're getting all of these advantages and that you're using the latest protections engineered by data security professionals. For more details about the right data security and protections for your school wireless network, please feel free to contact one of our technology experts and we will be happy to provide advice and further information.

Q: *Which is better and more cost-effective for school asset tracking: barcoding or RFID?*

A: In serving our clients and customers, we provide both barcoding and RFID technology, and sometimes it's not so much a matter of which one is better as which one meets your particular needs and budget. Barcoding is often less expensive in terms of printing labels and buying the equipment required for scanning, but it requires line-of-sight scanning of labels and is more labor intensive and less efficient. Ultimately, RFID offers more automation and a better and easier way to track and manage school assets because they can be scanned from a distance and tracked remotely by radio frequencies. But it requires more capital investment. However, the long-term costs of RFID are lower because automation greatly reduces the manual labor and time that is required when using barcode scanning.

While barcoding continues to be a preferred choice when dealing with high volume inventory such as groceries and food products, RFID has been replacing barcoding when there is a need to track, manage, and protect valuable assets such as school laptops, tablets, electronic equipment, textbooks, and office equipment.

> *... RFID offers more automation and a better and easier way to track and manage school assets...*

RFID technology uses radio waves to exchange identification and tracking data between an RFID reader and an electronic RFID tag that is attached to an object. A microchip in the RFID tag contains the data. In read-only tags, the data can only be captured. In read-write tags, the data can be captured, new data can be appended to the existing data set, or new data can completely overwrite the existing information on the tag. The antenna on the RFID reader enables the communication between the tag and reader. Readers come in both handheld and fixed-location varieties. The distance that an RFID tag can be read depends on a number of factors, including the environment as well as the size and type of RFID tag.

Ultra High Frequency (UHF) RFID is especially exciting for schools because it offers long read ranges with low-cost RFID tags, allowing schools to tag and automatically track large quantities of assets with minimal effort. Typical read ranges for UHF passive tags are 8 to 30 feet and beyond, with battery-assisted UHF RFID tags extending ranges to 25 to 100 feet. Ranges of up to 10,000 feet are possible with other types of tags and radio frequencies, including pinpoint accuracy to within one cubic foot.

With RFID, assets can be scanned and located at a distance or remotely with handheld or fixed readers that route information back to your database through your Wi-Fi network. RFID is typically used to detect the unique ID that is stored in the RFID tag for each asset. This ID is then matched with the same ID and the corresponding asset information in your database. Using asset management software, you can quickly and easily verify, update, and maintain each asset's location data and other critical data points.

This allows your school to know where valuable IT and other assets are located on your campus, track their movement and locations, and deploy optional hardware and software to generate alerts when assets are moved from their assigned or authorized locations. Thus, your school can be assured that assets are available wherever and whenever they are needed, and it can avoid damaging costs from theft and loss.

Overview: Benefits of RFID vs. Manual and Barcode Tracking

- RFID technology automates data collection and vastly reduces human effort and error
- RFID ensures that each asset is uniquely identified and location information is 100% accurate
- RFID supports remote, long-range tag reading with no line-of-site or item-by-item scanning required
- Scanners can read multiple RFID tags simultaneously, offering huge increases in efficiency
- All RFID tags within range can be detected instantly and matched with information in your database
- Assets can be cross-referenced against assigned locations and recorded as present, missing, or relocated
- Active, real-time tracking hardware and RFID tags can be implemented for continuous real-time tracking with pinpoint accuracy to one cubit foot
- Available scanners support both RFID and barcoding so you can upgrade at your own pace

RFID Reader Types

- Fixed RFID readers automate data capture at key entry and exit points, such as building entrances or classroom doorways, and typically require external antennas on either side of the portal.

- Handheld RFID readers allow on-the-spot reading of RFID tags, allowing school staff to perform quick and accurate inventories or search for specific items in a classroom, storage room, office, or any other location, even outdoors.

- Mobile RFID readers can perform as fixed RFID readers in temporary and hard-to-install locations or can be affixed to a cart and wheeled through a room, hallway, library, or data center for quick inventory.

- Presentation RFID readers are ideal wherever students, faculty or staff need to present RFID –enabled items to the reader, such as photo IDs, library books, audio/visual equipment, or other assets for checkouts and access controls.

A: Before you invest in an ID card system or upgrading your current ID card printers, identify your specific security and identification needs and compare them against the types of card printers and printing that are available. Based on these factors, you can choose the right card printer and ID card technology for your applications. If you need assistance with exploring your options, our experts are happy to help. Feel free to contact us with questions or for more information on the ID card printers and solutions that we recommend. In the meantime, here are a few key considerations to keep in mind when evaluating your needs and potential ID card printing solutions:

Key Considerations for ID Cards

- **The needs of your school and campus community**
- **Type of card you plan to use (e.g. magnetic stripe vs. smart cards)**
- **How many cards you plan and need to produce**
- **How often you need to print cards**
- **Printed elements that you need on your card**
- **Desired quality of your card images**
- **Type of encoding required on the card (e.g. smart chips or RFID chips)**

Five Major Factors in Choosing Card Printers

1. Card size
You will need to choose between standard vs. non-standard size and thickness. The standard CR-80 card, used for plastic cards in wallets and purses, measures 3.375" x 2.125" and has a standard thickness of 0.75 mm. But thickness can range from 0.25 mm to 1.5 mm.

2. Printing speeds
Printing speeds are driven largely by whether you need to print on both sides or just one side of the card. Printers are available in a variety of speeds and with support for one or two-sided printing. In general, as is the case with inkjet or laser printers for computers, faster printers are more expensive. The needs of your printer speed will also be determined by your application, such as on-premise or on-demand printing, mass duplication, or one-off jobs.

3. Physical characteristics
If you have workspace limitations, then a printer with a smaller physical footprint will be ideal. If the printer must operate in a space where other work is being performed, then you may also want it to be quiet. Space and noise factors can be particularly important in smaller school offices or in locations such as school libraries or classrooms.

4. Ease of use
To meet the needs of a wide range of potential users, including faculty and staff with varying levels of experience or comfort with printing devices, a card printer should be easy to use right out of the box. Make sure that any solutions that you choose is as simple and user-friendly as possible, and a good litmus test is to have it tested by a staff or faculty member who is not technically inclined.

5. Type of printing
There are a number of types of printing that you may need or prefer, and some offer distinct advantages or drawbacks. We have outlined printing types and their benefits, advantages, and disadvantages below.

Choosing Your Type of Printing

Thermal Printing

Just like other computer-based printers in your school, current photo ID printers are all digital. Most photo IDs are printed by digital thermal transfer, a process by which color is transferred from a single-use ribbon to various kinds of receptor materials. With 300 dots per inch (dpi) or higher resolution, thermal printers can produce reasonably good quality ID cards at a minimal cost.

Dye Sublimation Printing

To achieve true photo-quality printing with bright colors and no jagged edges, dye sublimation offers a great solution given the variable size and density of each color dot during this printing process. Dyes penetrate the receptor, color migrates from the dye ribbon onto the surface, and the spread of the dye depends on the amount of heat applied by the printhead. Yellow, magenta, and cyan colors are combined in varying proportions to print photo-quality images. For infrared readable bar codes and other data, a black resign is used instead. The number of images and the output per ribbon varies based on the type of ribbon, the number of panels on the ribbon, and the manufacturer.

Mass Transfer Printing

With mass transfer printing, the printer cannot control the ink dot's size or its density. The dot is simply printed or not printed, which is not a good choice for continuous tone images such as photo-quality images for IDs. To create the illusion of continuous tone from discrete ink dots, mass transfer printers use a process called dithering, which is the same behind-the-scenes operation that your computer performs when it sends a picture to an office laser printer. A mass transfer ribbon uses a layer of monochrome resin on a thin backing film. The resin is usually black, so this type of printing is also called "black resin printing." When heated, the resin is stripped from the backing and deposited as a physical layer on the receptor. Mass transfer delivers sharp text and graphics plus infrared readable bar codes. Its photo reproduction is quality is not ideal, but it is adequate for many applications that call for high printing speed and low costs.

Top quality card printers offer intuitive user interfaces and color touch points, making them easy to use...

Top quality card printers offer intuitive user interfaces and color touch points, making them easy to use and reducing the amount of user training required. With the right supplier and manufacturer, you can choose from a broad range of printers that offer full-color and monochrome card printing. Options from leading suppliers will typically include USB, wireless, or Ethernet connectivity; smart card, magnetic stripe and ultra-high frequency (UHF) RFID encoding; and lamination, card stock, and special features for higher security and card durability.

The printers that we typically recommend print directly to plastic cards using dye sublimation and/or thermal transfer technology. These printing methods offer edge-to-edge, high-quality card printing for a wide variety of uses. You can select from models that are ideal for higher or lower volume printing, with multiple security and encoding options to meet your specific needs. For some applications, we also recommend retransfer card printers, which are ideal when you need very high image quality or cards that are extremely durable and resistant to abrasion.

For more information on the types of printing processes and technologies that we typically recommend, we've provided some additional details below.

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Direct-to-Card (DTC) Print Technology

With direct-to-card or DTC technology, card printers use dye sublimation or thermal transfer methods to render a digitized image directly onto the flat surface of a plastic card. The number of affordable, durable card materials that accept dyes limits the types of cards that can be used for DTC printing and also limits the intensity of colors that DTC can reproduce. The DTC process depends on uniform, intimate contact between the printhead, dye ribbon, and card surface. Therefore, uneven card surfaces cannot achieve high color density and uniformity when dye is transferred directly to the card.

Retransfer Print Technology

Retransfer printing uses a process called reverse thermal transfer. Unlike traditional dye sublimation card printers—which use a printhead to transfer the image through a dye ribbon directly onto the card surface—retransfer printers use a two-step process:

1. Prints a high-resolution image in reverse, directly onto a clear receiving layer carried by a flexible, intermediate film. The dye sublimation process prints the image to the film, just like it does in DTC printing

2. Uses heat and pressure to thermally transfer the image and the entire image-receiving intermediate film onto the card surface. During this process, the layer thermally bonds to the card surface, and the printed image resides underneath the clear image-receiving layer.

Retransfer printing offers a number of benefits, including superior image quality, support for more types of cards, and the ability to produce tamper-resistant cards for improved security. Retransfer card printers also feature lower printhead costs, high throughput for high-volume and efficient printing, and simultaneous dual-sided printing.

How to Get Free Consultation and Expert Recommendations

At AB&R (American Barcode and RFID), we've been serving schools and businesses for 35 years, delivering the latest solutions and insights to meet ever-growing technology needs. We specialize in helping private schools and other educational institutions that need to meet rapidly increasing demands for greater wireless connectivity, security, efficiency, and cost-effectiveness. We offer free expert consultation to help you assess your school's needs and evaluate your best options in integrating wireless solutions to create and maintain a smarter, safer, and more efficient campus community. If you have questions, need additional recommendations, or you're ready to invest in wireless solutions to meet your urgent needs, we would be glad to help.

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

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