

Enabling the Wireless School

Growing Demand for Wireless LAN Access in K – 12 Schools

Many K-12 schools are seeking new technological solutions that help optimize learning and collaboration among their students, faculty and administrative staff. Following on the success of Wireless LANs (WLANs) in higher education, an increasing number of K-12 schools are also integrating wireless and mobile technologies to better meet instructional demands and provide more users with on-line resources. From connecting to the Internet and e-mail, to delivering online homework assignments, to providing collaboration tools in classrooms, WLAN access enables all stakeholders in the school system to benefit.

- **District Office and Administration Can Streamline Procedures:** Classroom applications can track each student's progress to facilitate reporting; provide up-to-date student information on hand-held computers; respond to emergency situations and handle disciplinary incidents, security enforcement and parent communications.
- **IT Department Can Optimize Performance and Cost Savings:** WLANs can accommodate rapid expansion, which is particularly important for schools using mobile classrooms that can make wiring very challenging. WLANs are also more economical than traditional wired connections, especially where wired connections would be prohibitively difficult—for example, schools that have no space for computer labs, or that anticipate future renovations that would require re-wiring in classrooms.
- **Teachers Can Be More Proactive and Accessible:** WLAN access increase interaction between teacher and students; complement classroom instructions with on-line applications including digital whiteboards and on-line testing; real-time access to administrative resources and design curricula that better meets individual learning styles.
- **Students Can Learn More Efficiently:** WLAN provides the opportunity for more free-flowing collaboration among peers, with teachers and digital resources and the Internet.

While higher education deployments focus broadly on delivering high-performance, pervasive wireless coverage across large campus environments, K-12 schools—with tighter budgets and limited IT resources—tend to deploy wireless to support specific mobility applications such as mobile carts, wireless IP telephony, video surveillance, mobile classrooms, etc. In order to support these and other emerging wireless applications (e.g., educational videos, location tracking, cafeteria point-of-sales systems, etc.), schools need a wireless infrastructure that can deliver reliable performance in dynamic, high-density environments.

Hidden Challenges of Wireless

With the broad availability and relatively low price points of WLAN products, however, it has become all too easy to deploy a WLAN without adequate understanding of the technology's limitations that could ultimately lead to degraded levels of service, security, and usability. Specifically, WLANs for K-12 schools must effectively address the following unique requirements:

Rapid Login & Reliable Connectivity in Crowded User Environments

WLAN in the classroom is designed to support connected learning, communications between teachers and students, and peer-to-peer collaboration. For these classroom users, wireless must

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be able to deliver immediate and reliable access to on-line resources and the Internet. Specifically, quick "log-in" (e.g., authentication), is required because classes typically run for less than an hour, rendering useless any technology that significantly cuts into valuable instruction time. In most schools, however, WLANs supports computer labs, mobile computer carts, and digital media centers – environments in which multiple users need simultaneous access to the network. Providing immediate and reliable connectivity in such environments is challenging due to over-the-air collisions that are left unchecked in a traditional WLAN environment. These collisions result in increasingly significant delays as more and more users try to login to networked resources. Moreover, adding more access points (APs) to increase performance only makes the problem worse by decreasing the transmit distance between the clients on the same channel (i.e., effectively increasing the interference in a given area). The problem can not be solved unless the network, rather than individual clients, control access to the wireless medium.

Simple and Cost-effective Installation

Deployment is one of the biggest hurdles to successfully adopting WLANs in schools. K-12 schools generally lack the necessary IT staff to deploy and manage WLANs. In addition, large K-12 wireless networks must be deployed during school vacations or during the narrow window of time between the start of the fiscal year and the beginning of the school year, placing enormous pressure on the already-limited IT staff. Finally, K-12 schools IT staff must often deal with unique building designs that involve multiple enclosed classrooms, long hallways and remote and temporary buildings. Traditional WLAN solutions require complex site surveys, channel planning, and on-going RF tuning. To complicate matters, WLAN deployments are typically phased in over time, necessitating on going changes to the network design. The wireless deployment may also be modified as more users are added, or new applications are deployed. These changes to the WLAN design are extremely complicated to plan, with potential ripple effects on the existing deployment, due to the limited number of non-overlapping (i.e., usable) channels. In particularly crowded areas, moreover, access points (APs) are placed closer together to take advantage of higher data rates, increasing the speed at which clients transmit data. However, careful planning to avoid adjacent APs having the same channel will only increases channel interference and network congestion.

Network Grows with the Needs of the School for Maximum Investment Protection

Unlike other enterprise networks, which may renew their infrastructure every two to three years, K-12 capital budgets do not permit such short infrastructure refresh cycles. This makes it exceptionally difficult to keep up with emerging capabilities and rapid standards evolution of WLAN technology, ranging from faster radios to new client devices to ever-changing security approaches. In addition, since future wireless requirements are not obvious at the time of deployment, the original network design is guaranteed to require modification. Advanced applications such as voice and video, for example, will require both more bandwidth as well as seamless mobility. Modification to the WLAN deployment to support these emerging requirements are extremely complicated to plan, with potential ripple effects on the existing deployment, due to the limited number of non-overlapping channels available. Often times, schools are forced to migrate to a newer and more expensive technology in order to keep up with the increasing usage and changing requirements. For these reasons, a school's wireless strategy must take into consideration, not just the initial installation and hardware costs but also investment protection that allows for a more gradual migration to future standards and capabilities.

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A Smarter Wireless LAN for K – 12 Schools

As schools become increasingly dependent on connected learning, WLANs will continue to play a growing role in the delivery and administration of K-12 schools. However, deploying a high-quality, wireless network that supports the technical and business requirements of K-12 schools is not as simple as it seems. In fact, early adopters have learned the hard way that most WLAN systems were designed primarily to deliver basic data applications (e.g., Internet access and email) to few users rather than bandwidth-intensive multimedia applications in crowded classroom settings. A new smarter wireless LAN architecture addresses the emerging requirements of advanced applications, user behavior, and educational IT requirements by combining centralized security and management with system-wide air traffic coordination and control. How does this translate to benefits for K-12 schools and network administrators?

- Guaranteed high priority delivery of multimedia applications in crowded user environments
- No RF expertise required to deploy and manage
- Low total cost of ownership & maximum ROI: Higher density per AP means fewer APs need to be deployed, no need for costly site surveys, and a coordinated network reduces the need for on-going support

With these advances in the performance, management and investment protection of wireless network infrastructure, schools can now deploy a pervasive wireless network confidently and cost-effectively.

Finally a Wireless LAN Solution that Just Works

Foundry Networks is leading the charge in delivering a wireless infrastructure that exceeds the expectations of K-12 schools. The IronPoint Mobility Series not only delivers comprehensive security and centralized management, but also addresses the critical elements for deploying enterprise-class WLANs that most networks lack, including:

Designed for High Density with Over-the-Air QoS

Foundry's IronPoint Mobility Series employ Over-the-Air QoS that deterministically schedules client transmissions. This significantly mitigates client collisions, allowing high densities of clients to receive switch-like performance on the wireless network. For larger areas where multiple access points are used, the IronPoint Mobility Series architecture uses coordinated APs to manage co-channel interference and collisions from clients in other cells. The combination of Over-the-Air QoS and global coordination of APs results in unparalleled performance for even the largest networks in the world.

Eliminate Complex RF Planning with Virtual Cell Technology

A school's high density of clients, unique building topologies with multiple enclosed classrooms and long hallways, and older construction create a challenging environment for wireless LAN deployment. Other wireless LAN solutions require complex channel planning in an attempt to mitigate co-channel interference, which can add significantly to installation time and cost. Foundry's IronPoint Mobility Series greatly simplifies this process with Virtual Cell technology, which eliminates co-channel and cross-channel interference. With the worry of co-channel interference removed, Foundry access points are simply placed in the best positions to ensure complete coverage. Complex 3-dimensional site surveys to ensure that access points on the floor above or below are on different channels become a thing of the past and the network is up and operating more efficiently in less time.

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Next Generation Architecture Delivers Investment Protection

Foundry Networks protects a school's network investment by delivering a wireless network that supports advanced applications like voice-over-WLAN without dramatically increasing in the number of Access Points or changes to the network design. The IronPoint Mobility Series saves money by minimizing operational as well as capital costs. Unlike other WLANs, The IronPoint Mobility Series offers the ability to layer multiple channels in a single cell for high capacity as well as support for high-performance b/g mixed networks also delays the need to migrate to higher data rate 802.11a or 802.11n applications. This results in easier management of the network for the IT staff.

Conclusion

With the Foundry Networks, schools do not have to sacrifice functionality for price, scalability, or the ability to migrate to future standards. All of this is built into the IronPoint Mobility Series. No matter what a school needs to accomplish with its wireless network solution, the IronPoint Mobility Series delivers the speed, capacity, management capabilities and affordability that K-12 educational institutions demand today and the future.

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