



# EXTENDING THE CLASSROOM WITHOUT BREAKING THE BANK

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## HIGH LEVERAGE TECHNOLOGY

A K-12 district in Saskatchewan or a community college in Kuala Lumpur, face the same basic educational technology challenge: How can you provide the connectivity, the bandwidth and the reliability crucial for e-learning while dealing with budgets that are constrained and are likely to go lower? Multiple single-purpose technologies are cost prohibitive. A technology that can be leveraged for multiple uses will cost less and provide agility to respond to growing and emerging needs.

For a growing number of schools and districts, the answer lies in increased use of high-speed wireless technology. Although most schools have existing wired systems that still provide value, as e-learning needs grow to include new applications, leveraging one IP network to provide connectivity for multiple uses is widely preferred to the cost of adding additional networks. More and more institutions are turning to outdoor wireless broadband networks and indoor wireless LANs as more cost-effective alternatives to wired expansion as the education technology revolution takes hold. These wireless networks can be used simultaneously for data and file transfer, automated testing, video learning, video security, voice calls and inventory management.

Wireless broadband networks and WLANs are proving themselves in all levels of digital learning environments. Wireless point-to-point (PTP) and point-to-multipoint (PMP) solutions are used to connect to a building, 802.11n mesh networks and wireless local area networks (WLANs) provide the access for IP enabled devices such as testing devices, computers, printers, phones, laptops and IP video cameras. Wireless solutions are also faster and easier to deploy and simpler to manage than wired solutions. And only wireless technology enables the mobile access crucial for the delivery of anywhere, anytime learning on- or off-campus. With these solutions, each classroom is enriched with data, video and voice connectivity while the same network provides connectivity to technical and support staff so that the students' activities are coordinated and supplies and facilities are fully prepared.

Fiction? Vapor Ware? Not really, there are schools doing this today with great results.

**FACT:**

In the United States, approximately 26 million elementary and secondary school children ride school buses twice a day, amounting to 52 million daily roundtrips, plus an estimated 5 million additional roundtrips for extracurricular activities.

*(School Transportation News Online, August 13, 2010)*

**EXTENDING THE CLASSROOM**

*In a rural school district in the northeastern United States, students are first bused to a central gathering location, then transferred to a different bus for the ride to school. By state law, the second bus trip is designated as instructional time, with the school day actually beginning on the ride. To help students begin working immediately, the district is considering making each bus an “extended classroom” by providing riders with access to the school’s network on their wireless devices. Students can begin working on learning management tools such as Moodle, access digital content from applications such as SAFARI Montage, submit work to teachers and have access to the school’s VPN, making the bus ride productive learning time and enabling the district to comply with the state law.*

One of today’s hottest topics in education is the idea of extending the school day, and its corollary, extending the classroom. As students become more dependent on using their mobile computers and wireless devices (like smartphones and tablet computers), they can use them to learn anytime and anywhere. Wireless technologies help schools extend the school day by enabling students to safely and securely access the schools’ learning tools and other education-appropriate materials available on the Internet, to work collaboratively with peers and to interact with faculty from anywhere on campus. In many cases, they can also access the network from home and from within the community. Especially interested in creating a learning environment on buses are rural districts — in locations as diverse as northern Canada and the Australian outback — whose students must spend hours a day commuting to and from school. Other institutions use connected school buses for athletic teams to do schoolwork while riding to and from events, and for classes or groups riding to a field trip.

**MANAGING AND TRACKING ASSETS**

*The combined eighth-grade classes of a large suburban school district are embarking on a field trip to an art museum in the city. There are two full busloads of students, and keeping track of each one is crucial. The school district uses Radio Frequency Identification (RFID) technology to automate the task. Each student is issued a card with an RFID chip identifying the individual. RFID readers at the bus doors confirm that the right students are on the right bus, and that all students are accounted for and that no one is inadvertently left off the bus or is left behind at the museum.*

Every school at every level has vast numbers of human and equipment assets that must be accounted for and tracked on a regular basis. Wireless technology that keeps track of students — for example, as they enter and leave a school vehicle or as they enter a lecture at which attendance is mandatory — is also ideal for keeping track of valuable equipment and assets. Tracking equipment ranging from document cameras to smart boards to classroom furniture and sports equipment with passive RFID tags helps schools use these assets more efficiently and productively. Institutions can also use wireless technology to assist in yearly supply and equipment audits. Imagine being able to use a handheld wireless scanner to audit a storeroom in 30 seconds as opposed to spending hours manually checking items.



## MULTI-MEDIA ON DEMAND FOR 30,000 STUDENTS IN TEXAS

Keller Independent School District (ISD), one of the fastest-growing school districts in the state of Texas, comprises 36 schools with some 30,000 K-12 students. To support its e-learning activities, including a 1:1 computing initiative that will eventually include wireless devices for every student, the district partnered with Motorola. To improve on spotty coverage provided by the district's previous wireless network, Keller ISD deployed Motorola's 802.11n wireless LAN infrastructure and the Motorola AirDefense wireless security and network assurance solutions. The Motorola wireless broadband network is working with the district's SAFARI Montage video system to enable the delivery of multicast and unicast video streams simultaneously to multiple clients in classrooms across the district. In addition, Keller ISD is working with Motorola to test a program to provide WiFi connectivity on school buses.

## CAMPUS-WIDE OUTDOOR CONNECTIVITY

*A major university with a multi-acre campus is served by a WLAN that provides students and faculty with good interior coverage. But, in response to student and faculty requests, the school decided to also provide blanket outdoor voice and data connectivity by deploying a campus-wide WiFi network that enables students and teachers to work and communicate online wherever they are, from quad to parking lots. At the same time, the outdoor wireless network provides all school employees — from maintenance to landscaping to security and more — to communicate in real time outdoors as well as indoors, helping to increase operations efficiency. The university is also using the network to deliver powerful security solutions including remote video surveillance.*

Whether they're going to school in Alaska, the Netherlands or Dubai, digital native and millennial students want to be able to use their computers and wireless devices just like they do at home: everywhere. They want connectivity not just in the classroom or the library, but over the entire campus. And they want more than the erratic "bleed through" coming from indoor systems; they want full service connectivity. Today's wireless broadband technology is fast becoming the system of choice for schools wanting to provide ubiquitous campus coverage both to meet existing needs and as a competitive advantage. Wireless broadband networks deliver reliable, high-performance outdoor connectivity, and are fast, easy to deploy, and exceptionally cost-effective.

Utilizing advanced solutions like Motorola's TEAM and TEAM Express technologies, campus employees can also communicate by voice, push-to-talk, texting and e-mailing no matter what devices they are using: wireless computers, smart phones, even two-way radios. This ability is essential for increasing productivity and, in emergency situations, for maximizing personal safety everywhere on campus without requiring everyone to have the same device — whether a two-way radio or a cell phone with a carrier service plan. These solutions enable cross-functional teams to collaborate and correspond, while at the same time supporting their individual job requirements and reducing the cost of additional devices and ongoing service plan charges.

## PERSONALIZED MULTI-MEDIA LEARNING

*A multi-location regional school district is planning for 1:1 classrooms as it initiates its strategy of providing a more personalized learning environment. The goal is to be able to deliver the bandwidth necessary to support the so-called “worst-case” scenario in terms of demands on bandwidth. In the true 1:1 classroom, students have individual laptop computers, notebooks, tablets and smart phones and are able to simultaneously view streaming video content from the web or from a third-party educational video management system. Each individual student will be able to view and work with the content in his or her own way, and also be able to work more closely with the teacher in one-on-one sessions. The district strongly believes in the potential of 1:1 learning to effect significant improvement in overall student performance.*

Delivery of bandwidth-intensive e-learning applications such as streaming video and multimedia is a challenge for virtually every school, whether K-12 or institutes of higher learning. It’s a dual challenge. Institutions must deploy a network able to support the high levels of bandwidth needed both outdoors and indoors. Outdoor networks must deliver the bandwidth to the facilities; indoor networks must make certain that the bandwidth is available to classrooms and other areas within the school building. Some schools reduce their bandwidth requirements by using a single video feed per classroom, using a projection technology to allow the video to be seen by the entire class. For schools dedicated to increasing personalized instruction, however, the goal remains true 1:1 computing. Schools preparing for this not-so-distant future are increasingly deploying outdoor wireless broadband networks and 802.11n WLANs that make use of the most advanced networking technologies. One example is networks based on Motorola’s intelligent adaptive architecture that enables the use of high-bandwidth applications like video, multimedia, and online testing in very dense user environments such as multiple 1:1 classrooms.



## MOTOROLA'S LEADERSHIP IN EDUCATION TECHNOLOGY

Motorola knows education. We offer more than 80 years of wireless technology leadership and innovation, including partnering with schools of all sizes in virtually all parts of the world. We offer an industry-leading portfolio of wireless broadband network solutions, including outdoor PTP, PMP and mesh technologies, and indoor WLANs based on powerful 802.11n technology. We are one of the few technology partners that can support connectivity in each of the institution’s targeted areas: in the classroom, across the campus and in the community. We also offer AirDefense, one of the world’s most powerful security solutions, and the integrated One Point Wireless Suite with powerful multi-vendor management and troubleshooting capabilities.

**FACT:**

An increasing number of U.S. states are adopting rigorous national educational standards called “common core standards” that will become the basis for mandated online assessment by the 2014-15 school year.

*(Lansing [Michigan] State Journal)*

**ONLINE STUDENT ASSESSMENT**

*In a major K-12 school district, administering standardized tests mandated by the government to be taken online causes a major disruption several times a year. In the past the district has taken over gymnasiums for days at a time, running cables to a battery of computers set up on the floor. Students take the tests in shifts, which can often cause two or more days of disruption to the school’s normal routine. To make compliance with state mandates easier, the district has begun to deploy wireless LANs that offer the same performance and reliability as wired systems, yet allow students to take the tests simultaneously in their classroom. Testing time is dramatically reduced, testing supervision is simplified, and the school’s routing for those not being tested remains unchanged.*

Online assessment is an idea whose time has come, especially since in some parts of the world, it is about to become mandatory or close to it. In the United States, for example, many states face pressure to adopt more rigorous new national educational standards and to enable online assessment in the next few years. Other governments around the world are considering similar initiatives. But government mandates aren’t the only reason schools are planning for online assessment. They also appreciate that computer-based testing enables faster reporting, more efficient data management, and increased security to comply with increasingly stringent testing regulations. Ultimately, especially with wireless technology beginning to be considered the standard testing solution, online and computer-based testing will increase the efficiency and effectiveness of standardized assessment while reducing the cost of test administration, and decreasing disruption of normal school schedules.

**INCREASED SAFETY AND SECURITY**

*A large state university on the eastern seaboard of the United States is integrating its wireless broadband with RFID functionality to help manage and increase security in restricted areas of the campus. When someone swipes a card at an RFID reader at the entrance to the area, an adjacent video camera automatically begins recording the person. Simultaneously, the system alerts security personnel at a centralized control point, who can immediately confirm access through visual identification.*

**FACT:**

During the 2007–08 school year in the U.S., 85 percent of public schools recorded one or more incidents of violence, theft, or other crimes, amounting to more than two million security responses.

*(National Center for Educational Statistics)*

Educational technology helps improve campus life in ways that go well beyond digital learning and 1:1 classrooms. Security is one of the most important. Wireless networks that connect the campus indoors and out are ideal solutions for increasing student safety and facility and campus security. High-speed wireless infrastructures are proving themselves exceptionally valuable by integrating existing and new video, access control and asset management solutions into a more proactive, intelligent campus-wide security system managed at a centralized command center. The security system is easy to use, making monitoring simpler and more effective through built-in intelligence and automatic alerting mechanisms. Results include enhanced situational awareness and faster, more effective response. Many schools are also using wireless

technology to create powerful temporary networks for improving security at special events such as basketball and football games or parents' weekends. Through use of video surveillance and real-time voice and data communications, security is heightened and events can be managed more efficiently and more effectively.

## VISITOR MANAGEMENT

*On football weekends, a university belonging to a major athletic conference faces a significant increase in traffic. Campus parking regulations are regularly circumvented and the university's security staff is forced to spend valuable time ticketing offending vehicles. The school decided to leverage its wireless broadband network to deploy an e-citation system in which each ticket is automatically entered into a system that enables online payment of fines and automated follow-up on unpaid fines. Results are significant. The system frees personnel from the time-consuming tasks of manual citation management, at the same time it improves the rate of first and second notice payment, resulting in an increasing source of revenue for the university.*



### FACT:

In a 2006 survey conducted by the National Association of Colleges and Employers (NACE), the average annual cost for company campus recruitment efforts is close to \$400,000, with some employers spending up to \$4,000,000.

*(NAS Recruitment Communications)*

Having a connected campus is one of the biggest competitive selling points for colleges and universities and even some private secondary schools. When visitors, including parents and siblings, students and faculty from other institutions, and spectators at sports events visit the campus, having ubiquitous WiFi access is both impressive and appreciated. Wireless networks enable the setting up of VPNs that let visitors access the Internet but shield them from the school's network, increasing access while preserving network and data security. Visitor access can also provide a valuable source of revenue, for example by charging visitors for WiFi access or by implementing an e-ticketing system for parking and traffic violations. Many higher education institutions also use wireless technology for secure credit card transactions both for tuition payments and for purchases at bookstores, sports stadiums, cultural events and restaurants. Wireless networks also help attract campus recruiters and streamline the recruiting process, which is growing more and more costly year in and year out. Schools are in competition to schedule recruiters and providing WiFi access to help them work more efficiently and productively can be a significant competitive edge, with your students being the ultimate beneficiary.

## THE WIRELESS CAMPUS

Universities, colleges and K-12 school districts around the world are rapidly migrating to wireless or combined wired/wireless campus-wide communications environments. That's not surprising. High-speed wireless technology provides the

bandwidth necessary to optimize student benefits from e-learning applications. Wireless broadband outdoor networks and indoor WLANs prepare educational institutions of virtually every size for the digital learning future in the form of 1:1 classrooms, increased personalization and more timely, more accurate assessment. The ability of wireless to provide anytime, anywhere access dovetails with digital native students' reliance on their wireless smart phones, tablet computers and laptops. Wireless technology also allows administrators to monitor and manage a single network from a single

command center, helping to increase campus safety and security, network availability and performance consistency. Equally important, wireless education networks offer a measurable return on investment, lowering technology, deployment and operational expenses and reducing total cost of ownership (TCO).

### MOTOROLA LEADERSHIP SERIES

This article is one of a series examining the challenges, the opportunities and the realities of how technological innovation is affecting the markets that most influence and affect the global community.



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