



## **ENTERPRISE & MOBILITY**

# **Building the K-12 Networks of the Future Today**

This document examines ways to enable both personalized educational trends and the various technological trends that affect—or will soon affect—virtually every school.

**BROCADE**

## **HOW WIRELESS TECHNOLOGY IS HELPING K-12 DISTRICTS AND SCHOOLS FUTURE-PROOF THEIR E-LEARNING NETWORKS**

Virtually everywhere in the world, K-12 school district leaders are engaged in improving their communications infrastructures. They want to take maximum advantage of revolutionary new educational technologies. They want to keep up with the new online world of their students. And they want to enter the expanding learning world of Google, Moodle, Facebook, and Twitter.

A few districts may already have their networks of the future in place, but most are somewhere in the planning and deployment process. Some are just starting. But no matter where your district is in the process, you and your IT Department should be asking two crucial questions. First, are you keeping your future needs top-of-mind in everything you are doing technologically today? And second, are you making sure your network is scalable enough to accommodate future growth and future capabilities? In other words, are you ensuring that your network is future-proof?

### **E-LEARNING TRENDS**

The future that K-12 school districts are preparing for offers truly exciting learning possibilities. As always, the overarching goal in education is improving student performance, and today's preferred methodology is to move to a more individualized learning model. Enabling a more personalized educational future will involve a variety of technological trends that affect, or will soon affect, virtually every school.

#### **1:1 Computing**

The gold standard for increasing personalized learning and individualized content is the 1:1 computing model, that is, learning environments in which every student is able to use his or her own computer or computing device. Currently available devices range from laptops to netbooks to PDAs to pad computers to smartphones.

#### **Ubiquitous Access**

The proliferation of web-enabled devices available to students and teachers make it possible to expand learning experiences well beyond the classroom, the study hall, and even the textbook. High-speed connectivity to the web and the school Intranet provides students with anytime, anywhere access to assignments, as well as the ability to delve into vast databases of information for research and to communicate directly with peers and teachers.

#### **Advanced Learning Technologies**

Teaching has moved far beyond the limitations of the traditional classroom setting where teachers teach and students listen. The new learning environments of today and tomorrow are more efficient and more flexible. Third-party learning applications such as SAFARI Montage and the Discovery Education network provide content that includes powerful technology tools, such as streaming video on demand. Learning management systems like Moodle and Blackboard enable teachers to create lessons and exercises online, generate tests, and even initiate online educational communities that can include students, teachers, and parents.

#### **Online Assessment**

In a few short years, many states will be migrating to all online and computer-based assessments in order to provide more rapid reporting, better management of data, improved security, and—ultimately—ease of use and reduced administrative costs. Soon the days of bubble forms and number 2 pencils will be long gone. A growing number of schools are currently doing online testing, but many schools are restricted to using only their wired systems until they become able to deploy more robust wireless networks.

#### **Collaborative Learning**

High-speed communications enable students who are already using interactive social networking sites to collaborate in real time with other students on common projects and assignments and to interact with teachers via e-mail or during online “office hours.” With the advent of technologies like Skype, it is also easier than ever to communicate and collaborate with schools and classrooms on other campuses, in other states, and even in other countries.

## PREPARING FOR TOMORROW

Preparing K-12 districts and schools for the new technology-based future is a necessary task, but not a simple one. The reality is, district IT directors are dealing with two kinds of networks. The first is the outdoor wide-area network (WAN) that delivers access to school and administrative facilities. The second is the indoor local-area network (LAN) that provides access for indoor areas such as classrooms, study halls, and offices. Today, as many districts are quickly learning, there are two significant challenges that combine to make planning and deploying both of these networks more difficult and complex. These challenges are cost and bandwidth.

## EXTERIOR CHALLENGES

Most districts have existing wired networks that connect one or a few locations, many using T1, T3, or fiber lines for connectivity to the school. But what about the potential for expansion? T1 and T3 circuits have limited bandwidth and restrict schools from taking advantage of all the available digital content and resources. And while fiber offers an exponential increase in bandwidth over T1 and T3 circuits, there are still many areas—such as rural locations and even some urban and metro areas where roadways block the installation of fiber—where telecommunications and cable providers cannot offer high-speed fiber networks to schools. Installing a privately owned fiber network, for most districts, is an overly complicated and cost-prohibitive proposition.

An equally critical challenge is the need for—and the cost of—bandwidth. Virtually all the learning technologies of the future are extremely bandwidth-intensive. To avoid placing a stranglehold on students' and teachers' abilities to use learning technologies to maximum benefit, the WAN must deliver high-bandwidth rates to the school. That is expensive, too, since most commercial networks base leasing rates on the amount of bandwidth needed, which can quickly drive up recurring costs.

## INTERIOR CHALLENGES

Indoor LANs have their own cost and bandwidth issues. The cost of wiring and rewiring as classrooms, offices, and other interior areas are configured, reconfigured, and remodeled is significant. Delivering sufficient bandwidth is also a concern. There is no question that the e-learning technologies of today and tomorrow—streaming video, collaborative learning environments, high-speed downloads, and more—are bandwidth-intensive. Schools must ensure that their LAN is able to consistently provide the high throughputs needed for students and faculty to utilize these and other bandwidth-hungry applications—both as a class and individually—inside the classrooms, library, study halls, and other areas. Schools must also make certain the network provides the mobility necessary to include the myriad of devices students constantly rely on in today's anytime, anywhere learning environment. The Brocade® Adaptive Architecture is uniquely designed from the ground up to support high-bandwidth applications like video in dense environments such as multiple 1:1 classrooms, delivering consistent, reliable, high-performance content and download speeds to each student device.

## THE MOVE TO WIRELESS

Given the cost and bandwidth issues inherent in wired solutions, it is no surprise that more and more K-12 districts worldwide are turning to high-speed wireless networks as their technology of choice for both WANs and LANs.

Outdoors, wireless broadband systems allow districts to overcome the formidable barriers of deployment expense and bandwidth cost. Wireless backbone networks can be planned quickly and (with no trenching) deployed exceptionally cost-effectively. A recent report by industry analysts The Greaves Group stated, "The rapid growth of [wireless broadband] solutions has allowed districts to substantially expand data rates at a lower cost per megabit than [wired] solutions."

Indoors, wireless LANs (WLANs) also provide the bandwidth needed for new e-learning applications at a much lower cost. The relatively new IEEE 802.11n wireless standard has quickly become the high-performance technology of choice for WLANs in a growing number of K-12 school districts. The exceptional throughput of networks that are based on 802.11n technology—up to 300 megabits-per-second (Mbps)—is ideal for supporting multimedia learning

content. In addition, most district networks will soon be accessed by student- and faculty-owned computers and handheld devices that are built to be 802.11n-compliant.

## **BROCADE MOBILITY WLAN SOLUTIONS**

Brocade is currently helping countless K-12 school systems to plan, deploy, and operate effective wireless networks that enhance digital learning operations in the present, and also to prepare the districts' networks to succeed in the near- and long-term future. Brocade is at the forefront of delivering advanced 802.11n performance that more powerfully and efficiently provides the high bandwidth needed for digital learning applications. Networks based on the Brocade Adaptive Architecture ensure that students, teachers, and administrators will be able to fully take advantage of the technology of the future to enhance students' learning experiences (see Sidebar).

Brocade is also a leader in providing the reliability, availability, and security needed to ensure that every student and teacher can make the most of the advanced digital learning applications of today and tomorrow. Network security systems such as the Brocade AirDefense security solutions keep outsiders out by providing gap-free 24/7 monitoring, detection, and automated removal of rogue devices and keep insiders in by preventing student devices from connecting to outside non-school hot spots. AirDefense also offers protection of student records in compliance with the most stringent industry standards and allows technicians to troubleshoot wireless issues across the district remotely, without travel. Wireless networks also provide for enhanced student, faculty, staff, and campus safety with video surveillance of perimeters, parking lots, and buildings, as well as emergency notification solutions and more. GPS capabilities allow tracking of school buses, and technologies like RFID can allow educators and administrators to keep track of students participating in school-sponsored off-campus activities. The bottom line is that the value of wireless broadband networks goes well beyond learning applications.

A growing number of K-12 schools and districts are partnering with Brocade as they plan to future-proof their e-learning networks. As a leader in the technology of both e-learning and e-living, we would be pleased to help you in any way we can.

### **The Brocade Intelligent Adaptive Architecture**

Not all 802.11n technologies are created equal. Unlike traditional "thin" architectures, the innovative Adaptive Architecture from Brocade uses highly intelligent access points to route information directly to its destination anywhere in the world, while still taking advantage of the benefits of a centralized controller. This significantly reduces network congestion and enables the use of high-bandwidth applications like video, multimedia, and online testing in very dense user environments such as multiple 1:1 classrooms. At the same time, Brocade Mobility WLAN access points, including the industry's only tri-radio access point, are capable of providing the dual function of access and network management, allowing Brocade AirDefense™ security solutions to be run on an alternate radio. For both security and compliance, Brocade Network Assurance™ and Infrastructure Management solutions can be run on a single piece of hardware, eliminating the need for—and expense of—separate dedicated sensors.

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