Getting schooled on next-generation mobility

K-12 districts that want to unleash the freedom that Wi-fi affords in learning and administration, should embrace sophisticated WLANs.

Business white paper

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Over the past few years, classrooms have come alive with rich experiences for learning. Teachers are able to wirelessly roam, engaging students like never before. Administrators can go room to room, observing lecture styles and jotting down notes. Children can reach out to their peers around the world and shrink the distance via face-to-face video conversations. And, instructors with discipline specialties can reach students in rural and urban districts alike.

To say this era of K-12 education is vibrant and thrilling would be an understatement. Opportunities abound everywhere for students throughout the grades to connect with materials in ways never imaginable before. They can interact via video, voice, the Internet, rich media, social networking, and components of the digital classroom. Students, faculty, and staff all want to access wireless networks—via their own devices or those provided by the school—to enhance learning.

While the applications, devices, and thirst for knowledge exist, many school districts are missing the chance to capitalize on this opportunity because of the limitations of their networks—their wireless networks, to be exact.

Most existing K-12 WLAN networks are based on slower legacy technology and, therefore unable to support the speed, performance, scalability, security, and ease of management that will be necessary in next-generation education environments.

Rohit Mehra, director of Enterprise Communications Infrastructure at the IDC research firm in Framingham, Mass., says K-12 WLAN infrastructure must change—and fast. "Soon wireless will be like air conditioning, electricity, and other services the district provides. It will be a utility that is expected," Mehra adds.

The HP Optimized WLAN Architecture is ground-breaking in that it is engineered to support the requirements of rich-media, real-time, and collaborative learning. Built on the standard 802.11n wireless protocol, the controllers, access points, and security are all geared toward enabling students, faculty, and staff to interact across a dependable, compliant, and high-performance network. This sophisticated infrastructure is designed to ease the burden on IT by unifying wired and wireless network management and simplifying scaling.

In this paper, we'll dig into the obstacles that K-12 IT teams are facing in expanding mobility and how the HP Optimized WLAN Architecture's unique features remove them.

Figure 1:
HP Networking offers intelligent 802.11n wireless networking solutions that provide access, management, and security with the flexibility to tailor your network easily to meet changing business needs.

Wireless learning: The new education goal post

Teaching is one of the most difficult jobs in the world. Motivating young minds to grasp new concepts and take an interest in the world around them has been a challenge from the early days of instruction. Yet new, dynamic applications are giving educators an opportunity to grab attention, offer instant feedback, and engage students like never before. Video, voice, chat, rich-media research, electronic textbooks, and more have opened a new world. These technologies are made even more powerful when used on mobile devices.

For instance, students can take tests on wireless tablets and the educator can instantly see the results. This enables the educator to gauge students' comprehension and, in real time, adjust the lesson plans accordingly.

Educators also can use wireless to encourage students to communicate with their peers in other schools across the district and around the world. It opens the students up to experiences beyond the four walls of their classroom.

Some schools have started to deploy such initiatives as "smart classrooms" and "one-to-one" laptop programs, where all students receive a laptop or tablet. However, in these districts and those still in planning mode, they are realizing the performance toll that such mass usage takes on legacy wireless networks as well as the insurmountable security, scalability, and management challenges.

District IT leaders have to shed their low-performance, ad-hoc, and easily compromised wireless installations for a state-of-the-art optimized WLAN architecture.

IDC research predicts the overall enterprise wireless networking marketing will grow from $2.2 billion USD in 2010 to $2.7 billion USD in 2011. "Enterprise adoption of WLAN will grow over the next five years. Increasing coverage and additional application on the WLAN will increase enterprise reliance on the network as a whole and drive new investments in network intelligence in both the core and the edge of the network," according to a March 2011 IDC report "Worldwide Enterprise Network Infrastructure 2011–2015 Forecast."

That last part of IDC's pronouncement is critical. The research firm fully expects wireless network intelligence to increase at the core and to make its way to the edges. "Schools that might have started with a smaller installation of consumer-grade wireless access points now need ubiquitous, intelligent access. That means installing a WLAN that can manage hundreds or thousands of users across multiple campuses," Mehra says.

Craig Mathias, principal at the Farpoint Group mobile technology consultancy in Ashland, Mass., agrees. He believes that organizations have to revamp their WLAN infrastructure as it could be the primary or default vehicle for many, if not most, large-network users, such as an entire district.

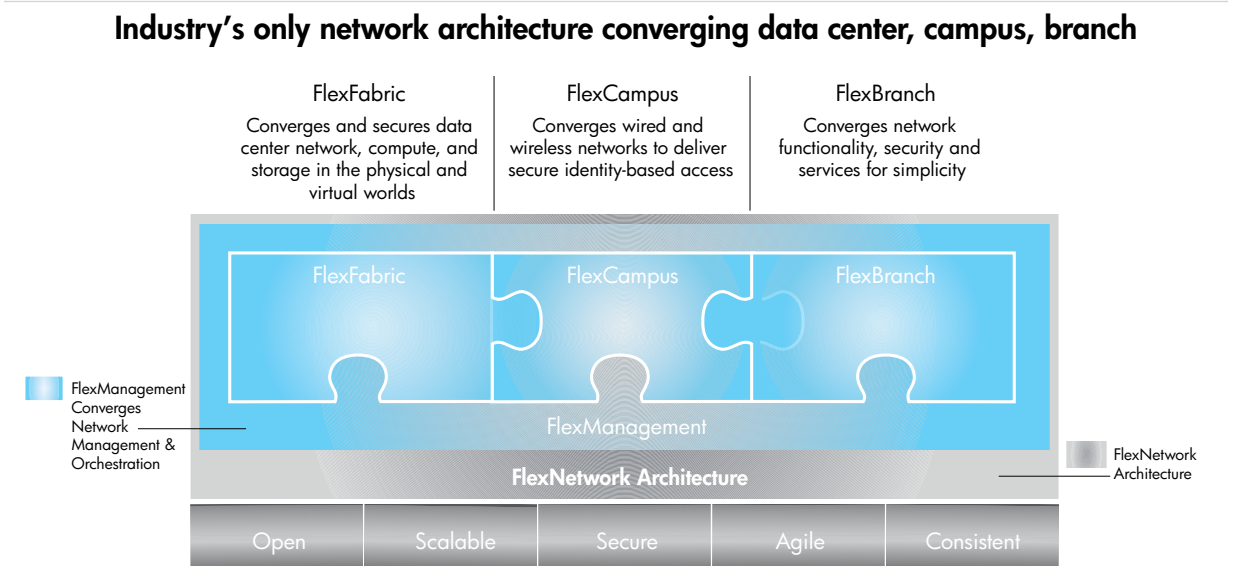
To support this growing user base and advanced applications, K-12 IT has to deploy a WLAN capable of automated configuration, policy enforcement at the access point, client load balancing, and advanced wireless network capabilities.

The HP advantage

HP is the answer for K-12 districts that want to provide their users with a high-performance, secure network that is easy to deploy, manage and provides low TCO via its single pane of glass management for wired and wireless networks.

The HP Optimized WLAN Architecture is part of the company's cohesive FlexNetwork strategy, a series of building blocks to integrate enterprise-wide wired and wireless networks. FlexCampus and FlexBranch are two of those modules that enable K-12 IT to create a sophisticated, fast, and safe WLAN and manage it as part of a unified enterprise.

Figure 2:
Hp FlexNetwork Architecture



Within the Optimized WLAN Architecture are HP MSM MultiService Access Points and MultiService Mobility Controller. The unique WLAN design puts intelligence at the edge (or access points), as IDC recommends, thereby improving security, scalability, and performance. As we'll show, with our WLAN strategy, IT can use a system of powerful access points, controllers, management, and security to increase capacity and throughput without jeopardizing security and performance.

This renaissance in WLAN architecture begins with the dual-radio MSM460/466 Access Points. These 802.11n access points are standards-based and increase user performance and range on wireless networks. The new three-stream technology delivers up to 15 concurrent high-definition video conferencing sessions on the network, while prior 802.11n offerings supported only 10; and 802.11g just one. The HP Mobile Access Solution is one of the first dual-radio 802.11n solution with wire-like speed and 900M bit/sec signaling to accommodate the growing number of wireless devices and deliver the performance for an improved user experience when accessing multimedia content.

The HP MSM Access Points also have onboard a critical technology called band steering, which allows them to automatically and transparently direct clients away from the crowded 2.4 GHz band to the higher-performing, less-congested 5 GHz band. Using the less-congested 5 GHz band avoids bottlenecks and ensures that students, faculty, and staff can easily share the WLAN.

"We've solved the performance challenge of how to allow iPads, tablets, smartphones and the like without killing network performance," says Sr. Product Manger for HP's MSM Access Point product line.

The dual radios enable concurrent operation in the 5 GHz band (MSM466) and the hardware makes use of standards-based 802.3af Power over Ethernet (PoE). PoE is critical for rapid, easy, and cost-effective deployment of access points. Otherwise, IT would be limited in where they could mount access points and potential coverage areas.

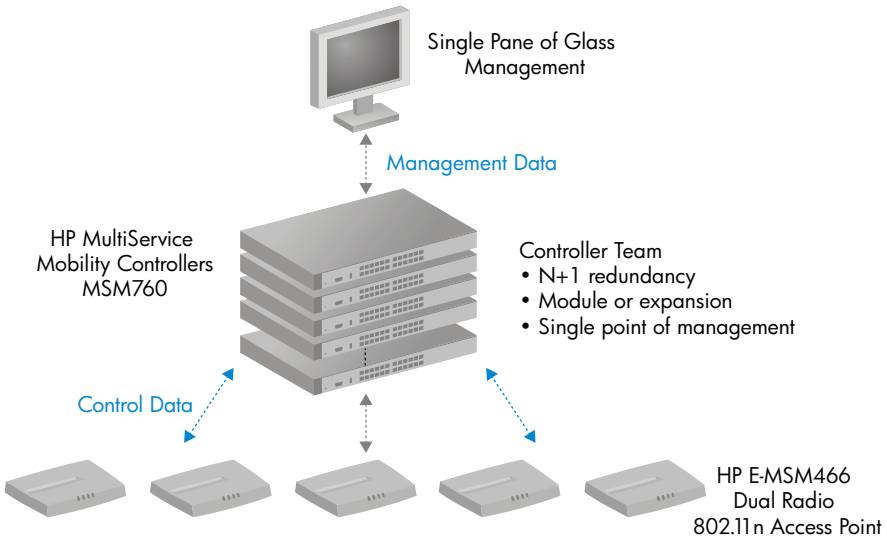
For maximum flexibility, these access points are backward compatible with previous models and boast 3x3 Multiple Input/Multiple Output (MIMO) antennae. This enables organizations to mix and match HP access points within the environment and to accommodate coverage outdoors and in high-density areas such as an auditorium. These features are critical for installation in enclosed spaces such as classroom walls and point-to-point communication.

The access points are part of a smart architecture that distributes capabilities, but centralizes management. They have enough intelligence and throughput to provide wireless access, deliver wireless traffic, enforce network policies, act as a wireless backhaul, and detect and prevent intrusions.

It's essential for access points to be able to handle policy enforcement and intrusion detection/prevention as they are often the gateway for malicious activity. For instance, if access points aren't adequately secure, hackers can sit in the parking lot and connect to the network. At the same time, they can be used to offer limited access to guests, substitute teachers and any other authorized, yet temporary users. Intelligent access points also give administrators the chance to confidently extend secure Internet connections to the community-at-large afterhours.

Working in conjunction with the access points as part of the HP Optimized WLAN Architecture is the MSM Controller, which centrally controls the WLAN system. The controller creates traffic handling policies for the access points to carry out, configures access points, and deals with special traffic requirements and when used in conjunction with RF Manager, the solution can protect point-of-sale transactions, such as cafeteria purchases, in accordance with the Payment Card Industry's (PCI)

Figure 3:
HP Mobility Manager 3.0



Data Security Standard. The MSM controller features the Mobility Traffic Manager so that administrators can tailor the distribution of WLAN traffic to meet their specific organizational requirements and business needs. MTM gives administrators tight control over how wireless traffic is routed across the wired infrastructure so they can manage the impact of WLAN traffic on the network and optimize network performance and service quality.

MTM provides ultimate flexibility in defining the optimal network traffic distribution model for any enterprise network. It enables IT administrators to improve service quality and optimize end-user experiences by:

- Segregating mission-critical and non-mission-critical traffic
- Preserving the continuity of IP sessions across L2/L3 roaming

RF Planner to map out wireless coverage areas. A series of WLAN outdoor bridges to help wireless networks span distances where traditional physical wired Ethernet connectivity is not feasible.

Protecting students and data

The HP Optimized WLAN Architecture features outstanding network security with the RF Manager wireless Intrusion Detection/Prevention System (IDS/IPS). Schools can protect users from malicious activity such as stolen records and identity theft. The wireless IDS/IPS has maximum threat detection with the lowest false positives. Dedicated sensors scan all RF channels 24x7—other vendors' offerings take a less comprehensive approach. Once a threat is discovered, it can automatically be mitigated, reducing the burden on IT or the need for specially-trained wireless security personnel. RF Manager generates targeted reports for PCI, HIPAA, and other compliance mandates such as the Child Internet Protection Act (CIPA).

"With a well-designed wireless network, districts can manage access on a granular level," Mehra says. For instance, IT can institute authorized access where students, faculty, and administrators can only read or download material relevant to their roles. Access activities can be tracked and logged for reporting and auditing. Mehra points out that ad-hoc systems do not support these types of controls.

In schools, such control is necessary to protect students and mitigate risk. An HP Optimized WLAN Architecture enables students, teachers, and guests to make use of district Internet connections without being able to venture into secure areas such as servers holding student records or heath information.

Easing and unifying management

One of the biggest distinctions between the HP Optimized WLAN Architecture and legacy WLANs is ease of management. Legacy WLAN environments tend to be complex with multiple, separate tools needed to manage them. They keep wired and wireless networks disconnected, which increases the number of staff needed to maintain them. And, they prevent universal security management from being deployed. Instead, IT must configure policies for each access point and controller, leaving the network open to breaches and attacks.

With HP, K-12 IT can manage the wired and wireless network as a one cohesive system through its FlexNetwork architecture. This blended environment can scale to 2,500 wireless devices and 3,500 wired devices—enough to support an entire district.

There is also ease of management within the WLAN alone. The PCM+ with Mobility Manger enables schools to quickly get up and running with their wireless deployment. Those devices can be easily monitored via graphical views such as heat maps and health dashboards. Software wizards alleviate the need for special wireless skills.

The Mobility Traffic Manager, a key ingredient of the MSM Controller lets administrators manage the distribution of WLAN traffic in a straight-forward and easy-to-configure manner. Using MTM, administrators can tailor the distribution of WLAN traffic to meet their specific needs. MTM gives administrators tight control over how wireless traffic is routed across the wired infrastructure. They can manage the impact of WLAN traffic on the network and improve performance and service quality.

MTM provides ultimate flexibility in defining the optimal network traffic distribution model for any enterprise network. It enables IT administrators to improve service quality and end-user experiences by segregating mission-critical and non-mission-critical traffic and preserving the continuity of IP sessions across L2/L3 roaming.

Administrators can control the distribution of wireless traffic by defining fine-grained traffic forwarding rules based on a wide variety of criteria, including VLAN/VLAN range; IP subnet; Virtual Service Controller (VSC)/SSID; location (i.e. a collection of APs); and user role.

These management capabilities are necessary for K-12 districts, which typically have small IT staffs and limited budgets. Being able to automatically configure, place, discover, deploy, and manage elements within the WLAN, such as access points, saves time and money that can be spent on direct educational tools. For instance, IT can automatically detect, isolate, troubleshoot, and repair an ailing access point as well as re-route its traffic until it is back online.

Farpoint Group's Mathias notes that unified networking is incredibly effective in lowering costs. "We see (single-pane-management) as a key to reducing OpEx and thus to optimizing ROI," he says.

Low TCO

HP has focused on providing a low TCO on its WLAN offering—a factor that is top-of-mind for district leaders. Better network utilization, lower total support costs, and energy savings from power-minded devices lead up to 66 percent lower total cost of ownership.[1]

"While much operational efficiency derives from features implemented in the management plane of a WLAN system, the cost benefits of improved performance and reliability will continue to be key drivers of enterprise productivity," Mathias says. "Again, the network exists to serve users and the greater the performance and reliability here, the more likely that labor-intensive support costs will be reduced to their minimum."

Low TCO has certainly been a driver for Gilbert Public Schools in Arizona. IT leaders there have used HP Optimized WLAN Architecture to cost-efficiently achieve their goals. The district is the fourth largest in Arizona with 38,000 preschool, elementary, and high school students as well as 2,300 teachers and 110 administrative employees. Gilbert itself was named one of the best places "to live and learn" by GreatSchools.org and strives to live up to that mantle.

In 2009, the school system reviewed its network as part of a seven-year, $49 million USD voter-approved technology investment fund and found it was time to change direction. They needed an increase in bandwidth, decrease in management responsibilities, and a broadening of the coverage area. Issues with the wireless network were keeping the district from taking advantage of the many communications advances of the past few years.

"It was frustrating for teachers to plan a great lesson and then not have the access to the network they thought would be there," says Barbara VeNard, assistant superintendant of education services for the district.

Like many of their peers are discovering, VeNard and other district leaders determined it was essential to deploy an intelligent and cost-effective system of wireless controllers, access points, management, and security that integrates with the wired network.

They used HP MAPs to establish ubiquitous 802.11n coverage and deployed MSM controllers to gain a single-pane view of the wired and wireless network. The district says the HP Optimized WLAN Architecture improved network dependability for critical teaching and administrative tasks. It also helped increase access to online multimedia teaching and advanced application for efficient administrative operations. For instance, educators can now multicast video and other material without negatively impacting the network.

"We simply couldn't support any of these capabilities with our old network," says Ward Heinemann, network manager for Gilbert Public Schools.

[1] Source: IDC, white paper, "ROI of a Complete Networking portfolio: Delivering Value from Network Edge to the Core," September 2010. Based on respondents to IDC study. Specific results will vary, depending on network size, applications supported, network topology, mix of wired/wireless infrastructure, etc.

HP Makes the Grade with K-12 Educational Institutions from Coast to Coast HP recently announced that three large school districts have chosen **HP Networking** solutions to improve network performance and keep pace with the demands of thousands of students and faculty. **Thompson School District** in Colorado, **Westerly Public Schools** in Rhode Island and **Paso Robles School District** in California evaluated networking solutions from HP, as well as Cisco and other vendors. Each district selected HP Networking products as their choice to address increased bandwidth consumption on their networks by laptops and mobile devices. **Read the news release** for more details on how they came to their decision.

HP is the future for K-12 learning

Every day, HP demonstrates its exceptional commitment to innovation, savvy product development, expert implementation, and responsive service—all of which are essential elements to running mission-critical networks. High-quality global sales, delivery, and support services are backed by a 30-year record of successful networking experience, as well as the talent and expertise of certified professionals and networking partners around the world. Additionally, the company's R&D and engineering teams are available to work side by side with HP customers, establishing a level of service intimacy unmatched in the networking industry.

As educators expand their toolbox to include exciting and enticing applications, HP provides the foundation for this new way of learning. The Optimized WLAN Architecture provides unparalleled mobility. Affordable, sophisticated, easy-to-manage, connected solutions ensure that IT can stay focused on deploying new methods of learning and not waste time maintaining separate wired and wireless networks and piecemeal access points.

In this new era, schools can safely use the power of wireless devices to tap a student's learning potential. It's an environment where education takes center stage, not the network. This is the future for K-12 districts as envisioned by HP.

Upgrade your school's wired and wireless network protocol to the ground-breaking, high performance Optimized WLAN Architecture, engineered to support the requirements of today's rich-media, real-time, and collaborative learning and tomorrows scale-up requirements. Visit: **www.hp.com/networking** to know how.

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