



## **A Scalable BYOD Access Strategy is Crucial for K-12 Districts**

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Prepared by:

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## Introduction: The Evolving School System

The IT demands on a school system are among the most complex of any organization. Schools are a mix of technically savvy users and nontechnical users. Additionally, technology is not upgraded consistently so different locations in the same district can have widely different technology.

Technology is becoming an increasingly important part of school operation, and the challenges around operating the IT environment continues to grow. Below are the most significant trends impacting K-12 school systems today:

- **Consumerization is rampant within K-12:** Students, faculty, administrators and anyone else involved with the school are bringing their own devices into schools today. This trend will continue to accelerate as devices become more advanced and more diverse.
- **One-to-one computing:** Schools have been challenged to create a one-to-one ratio of computing devices per student. Traditional computer devices, such as laptops and desktop computers are costly to purchase, expensive to maintain and, since they tend to be limited in number, need to be shared. Public school systems, at best, reach a ratio of one computer per 10 students — a far cry from the desired one-to-one goal.
- **Small IT departments:** K-12 organizations are typically budget-constrained and operate with very small IT staffs compared to general enterprises. It's common to have an IT staff of fewer than 10 people to support a district with multiple locations and thousands of users.
- **Doing more with less:** Increasing the amount of budget to build out a more robust data network and purchase more PCs or laptops is not realistic. K-12 organizations always need to consider cost-effective ways to reduce IT spend.
- **Integrating technology into the curriculum:** Schools across the country are embracing technology for learning purposes. Ideally, the technology would be a standard part of the educational curriculum.
- **Security:** Security has been a top concern for K-12 IT managers for years, today even more so. However, recently cyber security has taken center stage as more information, including assignments and test scores, have been placed online.

Embracing consumerization can be a big step toward helping IT managers in education meet these challenges. However, there are many ways of deploying a bring-your-own-device (BYOD) solution. A network-based solution can yield a scalable solution that can deliver all the necessary functionality while maintaining costs. However, IT must think about the network differently to achieve this goal.

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## Section II: Benefits of a BYOD Solution

School systems that adopt a BYOD solution will realize many benefits. School districts are becoming increasingly competitive, and IT must look to technology to help close the gap. K-12 districts with a BYOD solution will see the following benefits:

- **A one-to-one ratio of devices per student is an important goal:** For most school districts, there is no way this can be achieved within existing funding and budgets.
- **Higher levels of student and teacher satisfaction:** Allowing users the devices they feel comfortable with instead of school-issued devices improves user satisfaction and ultimately the utilization rate of online services.
- **Improved learning capabilities:** Having more information available in more ways means the student, whether at school or at home, can have consistent levels of educational support.
- **No compromise solution:** IT can implement without compromising security, scalability or performance. A well planned BYOD solution delivers a high-quality, secure experience protecting students, teachers and the district.
- **Centralized management:** By centralizing the IT infrastructure, IT management tasks are

simplified. This drastically reduces the time required for maintenance, changes or upgrades.

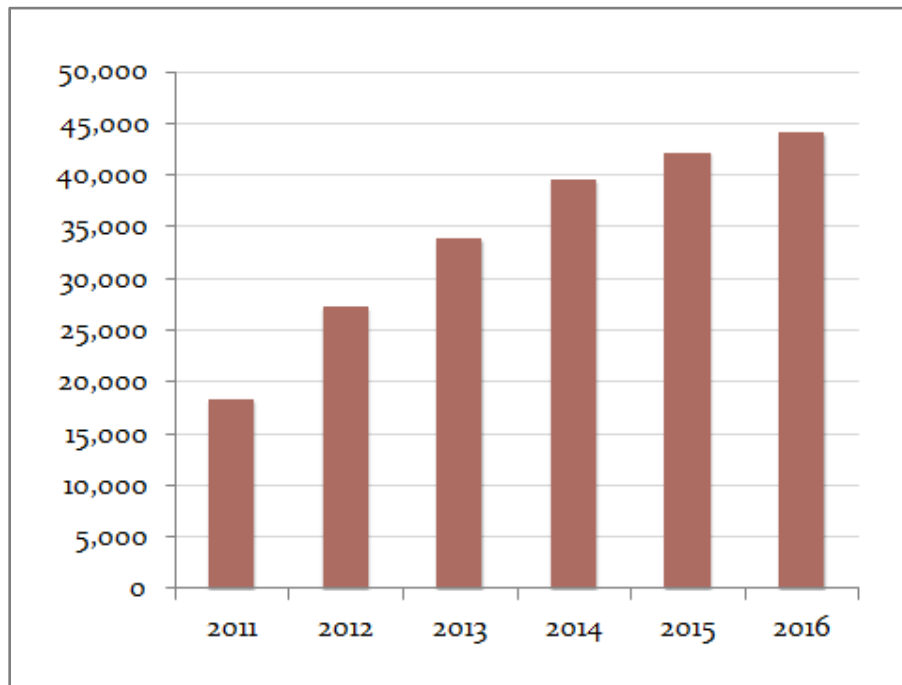
- **Affordable acquisition:** A primarily wireless solution is typically eight to 10 times cheaper to deploy than wired access. (This can depend on whether new cabling is required.)

## Section III: Challenges with the Current IT Environment

The IT architecture for most school systems has been in place for well over a decade, when static applications, fixed connections and IT control were the norm. Consumerization, mobility and wireless have completely changed expectations, with the biggest expectation being a scalable, robust BYOD solution. The key challenges enabling BYOD are:

- **Accelerating the growth of wireless end points:** Tablets and smart phones are selling far faster than traditional PCs and laptops. In the U.S., tablet sales are expected to grow from just over 18 million units in 2011 to 44 million in 2016 (see Exhibit 1). Most devices brought into schools today do not have wired interfaces, making wireless the primary access technology. As this trend continues, it's critical IT supports this rapidly growing number of wireless devices.

**Exhibit 1: US Tablet Sales (Thousands of Units)**



Source: ZK Research, 2012

- **Old layer 1 infrastructure:** The cabling used in many schools is very old, and can only handle limited bandwidth. However, the cost of rebuilding the network for a more modern network is cost-prohibitive and usually out-of-the-budget.
- **Influx of consumer-grade wireless:** Many faculty members may already use their own consumer-grade Wi-Fi access points for their own devices or for student connectivity. These are typically difficult to manage and scale. Since they are meant for consumer use, they lack the security and reliability of access points meant for business use. This can also only provide local access via the classroom or per school.
- **Poor wireless network design:** Since many K-12 networks were cobbled together over the years, they were not architected to handle one-to-one device ratios. There are often gaps in wireless coverage and heavily saturated access points in densely populated areas. Wireless coverage must be pervasive across the campus for a scalable BYOD solution.
- **Low user expectations:** Since the pace BYOD has been more rapid than network upgrades, students and faculty have not enjoyed a high quality experience. This can create significant issues when using the devices for educational purposes or for testing purposes. Low expectations mean users will find other ways to gain access to the network.
- **Security concerns:** Consumer devices and nonschool owned end points can create multiple

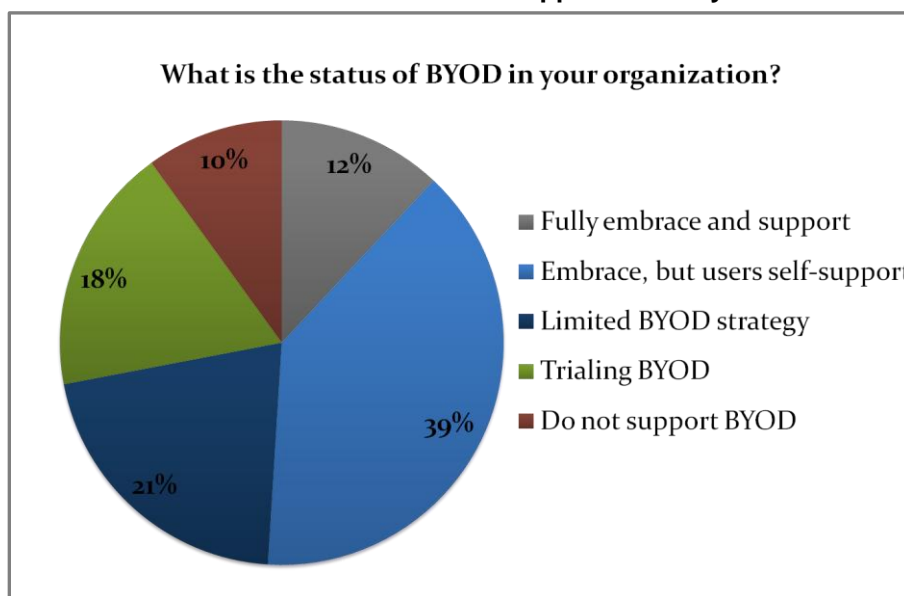
security risks. Cyber bullying is a significant problem because of the rise of social networks, and schools must create a safe technology environment. Students gaining access to restricted content can also create liabilities.

- **High IT management cost.** For infrastructure deployed on a location-by-location basis, making changes, applying patches or other administrative tasks often require a site visit. This is expensive and time consuming.
- **Underutilized IT infrastructure:** Many K-12 districts are decentralized IT environments, meaning disparate server farms located across the district. This means inefficient use of compute resources and inability to leverage unused capacity in other systems. Ideally, school systems would consolidate compute resources in a centralized location and virtualize the server to improve server utilization. ZK Research shows the use of centralized virtual servers improves server utilization from under 25 percent to well over 70 percent.

### Section IV: Implementing a Network-Based BYOD Strategy

Despite the significant challenges facing the IT departments of K-12 organizations, the demand for use of consumer technologies is not going away. U.S.-based CIOs now favor BYOD, due to overwhelming user demand (see Exhibit 2).

**Exhibit 2: BYOD is Well-Supported Today**



Source: ZK Research, 2012

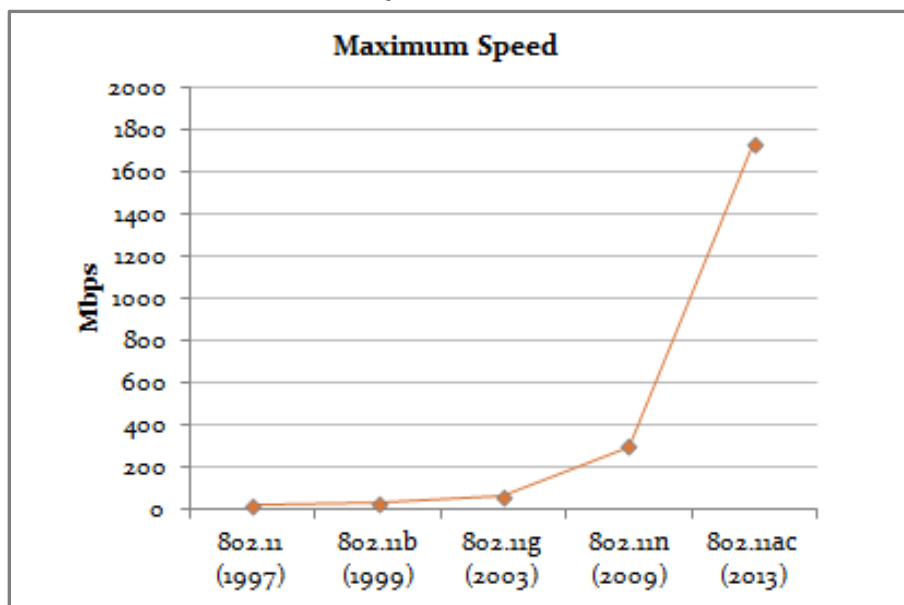
To enable a successful BYOD strategy, K-12 IT departments must take the following steps:

- **Embrace consumerization:** Allow students and faculty to procure their own end points. This is ultimately what the users prefer, so IT should work to enable it. This may be the only cost-effective, scalable way to achieving a one-to-one ratio of compute devices per student.
- **Tablets for kindergarten:** Implement a tablet computer program starting with kindergarten. A handful of U.S. school districts have made it mandatory for all students entering certain grades to have a tablet. These are then used to augment the current academic curriculum.
- **Retire traditional PCs in classrooms:** Classrooms often have PCs that are several years old and cost far more to maintain than they are worth. Use this budget to kick-start a BYOD strategy by funding the initial acquisition of tablets for lower income students.
- **Secure E-Rate and Title 1 funding:** The rules around Title 1 and E-Rate are in constant flux. The best way to fully leverage these sources is to understand what's changed but not to overlook the factors that did not change. For example, in 2011, for E-Rate funding, the FCC streamlined the application process by eliminating the need to submit a technology plan to the United Service Administrative Company (USAC) for Priority One services (telecommunication and Internet). However, the

plan still needs to be submitted for Priority Two services (file servers, wiring, switches, etc). So even if plans were submitted in the past and rejected, it may be worthwhile to resubmit under the streamlined rules.

- **Eliminate consumer-grade infrastructure:** Do a site audit, find the rogue network devices and eliminate them from the network. This eliminates many security risks to the school district as well.
- **Repurpose wired infrastructure:** Wi-Fi will be the primary access network for most end-user devices. The wired network can be repurposed to enable multimedia services such as VoIP, videoconferencing and surveillance. Since the Wi-Fi infrastructure terminates into the wired network, a rock-solid wired foundation will enable a consistent user experience
- **District decisions:** Make all decisions and implementations at district level. This creates much greater network efficiency, reliability and delivers a consistent user experience. This also provides a consistent set of services for people traveling between schools across the district.
- **Adopt an 802.11N solution:** This can deliver the necessary scale, speed and security needed to make wireless the primary access technology. However, IT managers should prepare for the future. The next standard for Wi-Fi, 802.11ac, is on the horizon and will provide a huge jump in wireless access speed (see Exhibit 3).

**Exhibit 3: WiFi Speeds Now and in the Future**



Source: ZK Research, 2012

- **Enable security at the network layer:** Traditional end-point security will not work, since the devices are user-owned. The network solution should have functionality such as user roles, URL filtering and encryption.
- **Mobilize the school:** Teachers should integrate tablets and smart phones into the teaching process, homework can be delivered via the cloud, all handouts and presentations should be downloadable, and remote online testing used.
- **Roadmap to unified communications:** Once the strategy is implemented, usage will explode and students and faculty will want to use the devices for more purposes. Teachers can keep in touch with parents using chat or video conferencing, remote learning can be implemented, classroom sessions can be recorded and played back for absent students. UC is an excellent complement to mobility.
- **Consolidate data centers:** Instead of having data centers scattered across the district, consolidate the functionality into one or two data centers. This creates a central location to act as a resource pool to deliver services, consistently across the district.
- **Virtualize the infrastructure:** Once the data centers are centralized, IT should leverage virtualization to improve resource utilization of IT assets. Consolidating and virtualizing servers improves performance, allows memory sharing and improves resource utilization. Over time, more IT infrastructure such as application delivery controllers, security appliances and network infrastructure will be offered virtually, so implementing virtualization now allows the district to deploy solutions as they are made available.
- **Educate the faculty and staff about what's possible:** The investment the school district will make in BYOD will only yield the desired results with proper education. Train the faculty and school staff on how to access internal systems while at school but also remotely. Help teachers integrate technology into the curriculum. Many free and low-cost applications are available, so take the time to investigate them.

## Section V: What to Look For in a Solution Provider

The era of consumerization is here and it's important that K-12 organizations aggressively tackle BYOD deployment. The choice of network solution provider is critical to success. However, the choice of solution provider may not be obvious. The following are key criteria to consider for network vendors:

- **Large install base of K-12 customers:** BYOD will be new to many IT managers in school districts. It's important that the provider has a large install base of K-12 customers. This will help avoid many challenges that may arise.
- **Solution that leverages virtualization for scalability:** Virtualization has been successful in K-12 because it scales server infrastructure and doesn't break the bank. Virtualization can bring the same benefits to network infrastructure and any new solution should leverage it.
- **Broad network portfolio:** While wireless is the primary access technology, there is no such thing as an all-wireless network. A provider should deliver not only 802.11n but routers and switches for an end-to-end, districtwide network. Network switches will also require power-over-Ethernet (PoE) for access points, eliminating the need to extend electricity everywhere.
- **Security built into the solution:** This is critical for schools. Traffic must be terminated before it enters the school network. User roles and URL filtering are must-have network features.
- **High availability and reliability:** No matter how redundant networks are, problems arise. Ensure the solution is highly reliable and has high availability options for continuous operation. This is important even for systemwide upgrades. When an upgrade is done on the primary system, have it switch to the secondary solution instead of making services unavailable to users.
- **Centralized management:** This is a key step in reducing the network's operational expenses. The network solution must have a centralized management console to enable IT visibility across the district's network from a single point.
- **Robust unified communications (UC) portfolio:** One of the main benefits of a BYOD solution is greater collaboration between students, teachers, staff and parents. Robust UC with features such as VoIP, chat, unified messaging, Web conferencing and video can take collaboration to the next step. UC makes it possible to interact with anyone, any time.

## Section VI: Conclusion and Recommendations

BYOD was once scoffed at and considered a crazy idea for school systems. However, the evolution of devices, the integration of technology into everyday life, cloud-based resources and wireless evolution moved BYOD from a vision to a reality. School districts that adopt BYOD will lower the overall cost of running IT, enable new ways of educating and improve the overall technology experience for students, faculty, staff and others involved with school systems.

It's important that IT departments act with a degree of urgency to avoid falling behind. To help get started, ZK Research recommends the following:

- **Embrace BYOD now:** BYOD can change the way schools function and educate. Instead of looking at consumer devices as something that should be shut down and not allowed, put the proper controls in place to enable them. Not doing this now means users will find their own solutions, creating big management and security challenges in the future.
- **Build a rock-solid network foundation:** The network is the right platform to build a BYOD solution on. Deploy a solution with a highly scalable wireless edge that terminates into a wired network capable of carrying all the user data, plus multimedia traffic.
- **Leverage virtualization for more than just server consolidation:** Virtualization is a powerful technology that can deliver economic and operational benefits to areas other than just servers. Virtual application, storage and network solutions should be investigated today as part of the overall BYOD solution.