



## **Pervasive Mobility Drives the Need for Wireless LAN Evolution**

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## I: Introduction: The Era of Pervasive Wireless is Here

Today's CIOs face significantly more challenges than at any other time in history. Companies look to IT departments to boost worker productivity and simultaneously lower the cost of IT. The shift to pervasive mobility is a significant step that allows companies to achieve both goals. Historically, the shift to pervasive mobility has been difficult and expensive to implement, and as a result it was a reality for a very small number of organizations. However, a number of technology trends have come together to create a "perfect storm" effect, which will bring this vision to reality. These trends are:

- **Proliferation of wireless devices:** Just a few short years ago, wireless in the enterprise was limited to laptops and a few purpose-built devices for specific vertical industries. However, the past 24 months has seen an explosion in the number of wireless devices, which now includes laptops, tablets, smart phones, and vertical-specific devices such as medical devices and factory equipment. In fact, many of these devices have no wired interface, further increasing the demand for WLAN. As the number of wireless-enabled devices continues to grow, so does the importance of the wireless network. ZK Research forecasts that the number of mobile devices will grow to 1.62 billion in 2015, up from 1.2 billion at the end of 2010.
- **Consumerization of IT:** Workers increasingly make the decision about which technologies are used in the workplace. Consumerization's overwhelming wave created a flood of devices in the workplace. Today the number of devices per worker is about two-to-one, but ZK Research predicts that will grow to seven-to-one over the next five years. The majority of these devices require a robust, secure wireless network to function as a corporate productivity tool.
- **Advancements in WLAN:** WLAN technology has evolved faster than wired technology over the past five years. The 802.11n WLAN can provide a similar user experience to wired networking, and more workers are choosing wireless over wired connections. WLAN is positioned to be the primary access network in companies today. Exhibit 1, below, shows that 35 percent of companies surveyed predict that two years from now over 80 percent of workers will use WLAN as the primary access technology.
- **Virtualization evolution:** Virtualization is now a mainstream technology. In 2010 the number of virtual workloads exceeded the number of physical servers. Virtualization has impacted almost every part of IT, except the network. For companies to maximize the ROI of virtualization, it's time for the network to leverage this technology as well.
- **Growing mobile worker population:** Historically, mobile workers were corporate professionals, executives and field service workers. Today of this group also includes campus workers such as nurses and doctors, students, administrative staff, and a variety of other job types.

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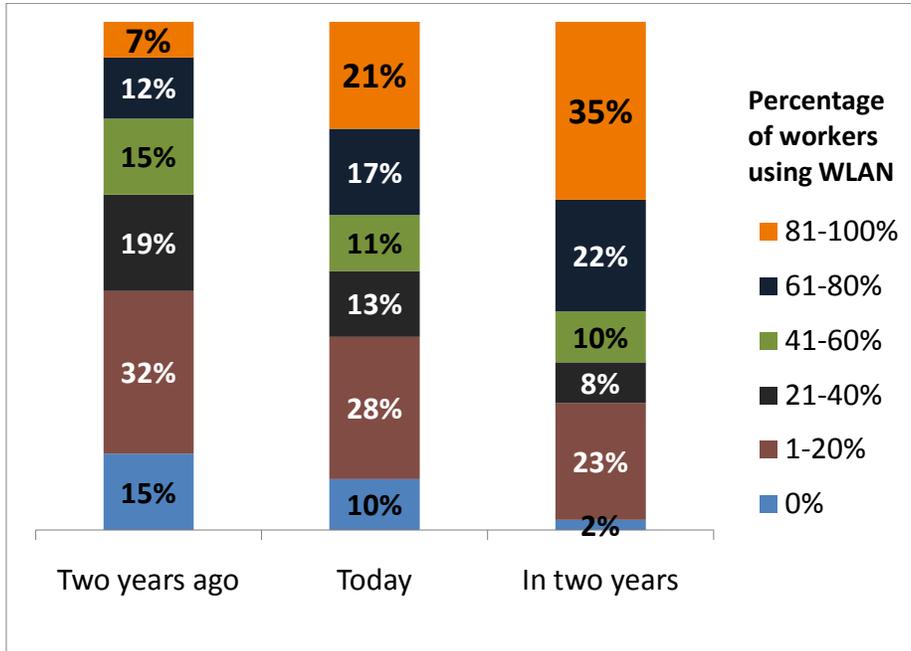
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**Exhibit 1: Wireless LAN Continues to Gain Momentum**

**What percent of workers use WLAN as their primary access technology today compared to two years ago, and what is the expected number two years from now? (n=772)**



Source: ZK Research, 2011

These trends are well underway and have driven the industry closer to the vision of pervasive wireless access.

**II: The Evolution of Wireless LAN**

Wireless LAN technology has gone through several evolutionary phases since its inception. The main phases of WLAN technology are as follows:

- **First-generation WLAN:** Ad hoc deployments. In this phase, wireless is deployed on an ad hoc basis, with the technology often purchased by a single department or even an individual. This allowed early adopters to realize the benefits of wireless technology, but access was limited to the range of the individual access point. The primary function was to bridge users from the wireless to the wired world.
- **Second-generation WLAN:** Enterprise standardization on fat access points. Once the demand for wireless technology started to reach a broader set of workers, the complexity of managing dozens or even hundreds of individual access points was far too high to allow the technology to scale. Organizations standardized on access points from a single vendor, which

brought some consistency to the deployment. However, each access point was provisioned and managed as independent network devices, making maintenance and change management time-consuming and error-prone. These autonomous access points could not perform access control functions and were not part of a system. Each access point was an island of wireless access.

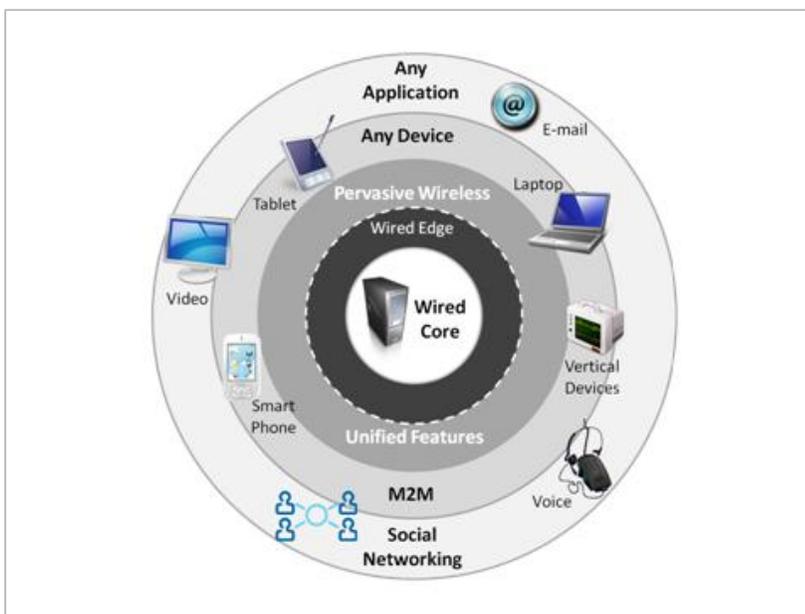
- **Third-generation WLAN:** The wireless controller era. The wireless switch was introduced as a way for companies to manage an enterprisewide wireless network from a central control point. In this model, each access point is a “dumb” end point with all of the intelligence in a centralized hardware controller located in the same LAN as the access points. This has been the predominant deployment model for the past five years and met the challenge of augmenting the wired network. This deployment creates a unified system, so security and traffic management policies can be easily implemented from a centralized controller. On the RF side, access points can operate in tandem to optimize coverage and minimize interference. However, as companies look to

make the wireless network the primary network, third-generation wireless LAN has the following limitations:

- **Expensive deployment model:** As wireless continues to evolve, the intelligence of the solution comes in the form of a physical appliance, the wireless controller. Wireless controllers are typically very expensive and as the deployment grows, more controllers are required. It's common for companies to have individual controllers in branch offices and departments for better granular control over access points. The numerous controllers drive the cost of deployment up.
- **Poor user performance in heavily utilized areas:** Current WLAN technology acts much like a hub did in wired networking. That is, it is a shared medium that all devices connect over. Any single bandwidth-intensive stream can degrade performance for all users connected to the wireless network.
- **The wireless switch model creates large amounts of network traffic:** When a configuration or maintenance change is made to the centralized wireless controller, these changes are replicated to all of the other controllers. Depending on the change or update, this can cause a significant amount of network traffic, which can be problematic over wide-area network links.
- **Scale limitations:** A controller imposes scale limitations in terms of users, access points, throughput, and mobility domains.
- **A resilient architecture is expensive:** Building resilient wireless LAN deployments requires dual controllers in every location. This can be a very expensive proposition for organizations with many branch offices.
- **High cost of expanding implementation:** Third-generation WLAN requires extensive and costly site surveys to add capacity to the existing solution for growth or for relieving congestion in heavily utilized areas.
- **The solution was designed to augment the current wired networks:** Today's incumbent controller-based solutions were designed as an overlay to the current wired network, with the assumption that wired was primary. Today's enterprise requires a solution built for wireless as the primary or only access technology.

Wireless has been through many waves of evolution, each one driven by market demands. Today, the industry sits on the precipice of another major shift for wireless. For organizations to fully realize the vision of pervasive wireless — any application to any device in any location — wireless LAN must evolve again (see Exhibit 2, below). This has given rise to the era of virtual wireless LAN.

## Exhibit 2: The Vision of Pervasive Wireless



Source: ZK Research, 2011

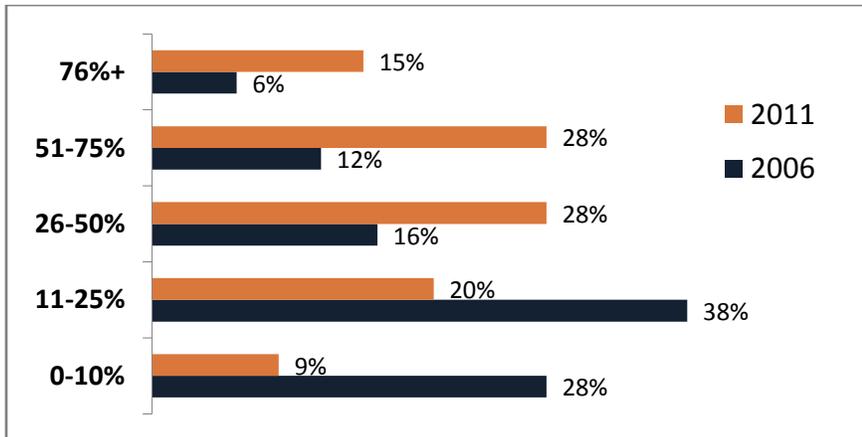
### III: The Next Generation of Wireless LAN is Virtual

Virtual wireless LAN (vWLAN) is the next, or fourth generation of WLAN technology. vWLAN brings the many benefits of virtualization to the wireless network by allowing the controller function to run in a virtual machine. Virtualization, for the purposes of

server consolidation, has been one of the biggest technology trends in computing over the past half decade. Exhibit 3, below, shows how rapidly server virtualization has been adopted since 2006. Today over half of an organization's workloads are virtual. The technology brings better reliability and performance at a much lower cost. The wireless network can realize these same benefits by embracing virtualization.

#### Exhibit 3: Virtualization of Servers has Reached Critical Mass

*What percentage of your workloads run on virtual machines today compared to five years ago? (n=857)*



Source: ZK Research, 2011

Virtualization has had a tremendous impact on the world of applications, servers and storage and will transform the WLAN network through the following:

- **Less hardware required:** Because the controller is virtual, it can be deployed on any set of servers in a data center, department or office. This means no more costly controller hardware for that functionality. This has significant impact on overall TCO for wireless networks, lowering capital costs, and lowering operational costs via simpler deployment.
- **Ultimate deployment flexibility:** Because of controller costs, organizations often need to choose where controllers reside, where backups are, and what capacity is required. Virtual controllers remove that decision. Virtual control is deployed on an as-needed basis.
- **A fault-tolerant solution:** A recent innovation in virtualization is the ability to move a virtual machine from one set of physical servers to another in real time. IT managers can move virtual controllers for maintenance or disaster recovery, creating a fully fault-tolerant solution.
- **Integrated security:** With vWLAN, security features such as network access control, guest access and filtering is applied at the access point, turning away unwanted traffic instead of letting it enter the corporate network. This provides much faster response to security threats than legacy wireless solutions.
- **It goes green:** vWLAN eliminates 80 percent of the power draw of the typical WLAN. It also eliminates the carbon footprint behind the lifecycle — manufacture, shipping, installation, use, disposal — of the controller.
- **Optimized performance:** vWLAN applies bandwidth optimization techniques such as admission control, quality of service and packet prioritization as soon as it enters the network. This is a distinct performance advantage over traditional controller-based solutions that are shared mediums.
- **Centralized control for a distributed enterprise:** No more controller islands. The entire multisite enterprise can manage its wireless networks as one, for consistency.
- **Liberates control from the LAN:** Control and management does not have to reside on the same LAN as the access points. Control and management of an access point (and the users) can take place anywhere in the network.

- **Economics and scalability:** Brings the same economics and scalability to WLAN as virtualization brought to the computing space. Organizations made significant investments in virtualization technology to secure and scale the data center. vWLAN follows the same principles, allowing companies to realize the same operational benefits and cost savings.
- **Virtualization enables new business models:** The solution makes hosted/cloud service delivery of WLAN possible.
- **Brings higher capacity:** With a vWLAN solution the data is managed directly by the access points. This means the overall solution can accommodate an order of magnitude of users than a traditional, controller-based solution. Most large controllers can support 4,000 users. A virtual controller can support 48,000. Similarly,

most large controllers can support 150 access points whereas a virtual controller can support 1,500. This is done in software on a hypervisor as opposed to a large, expensive controller, creating savings in both CapEx and OPEX.

- **Moves the enterprise closer to being truly mobile, instead of just portable:** True mobility allows workers to access any application from any device in any location. Prior to vWLAN the cost and performance limitations of controller-based solutions allowed organizations to be portable; workers could carry a limited number of corporate-issued devices to different locations, but they were not truly mobile. The scalability and cost advantages of vWLAN brings companies closer to this vision (see Exhibit 4, below).

**Exhibit 4: Portable vs. Mobile**

Criteria	Portable	Mobile
<b>Experience</b>	Limited mobility	Pervasive mobility
<b>Architecture</b>	Wireless overlay	Wireless as primary network
<b>Application types</b>	Static	Mobile, cloud and virtual
<b>Devices</b>	IT-owned	Consumer-owned
<b>Wireless infrastructure</b>	Controller-based	Virtual wireless

Source: ZK Research, 2011

#### IV: What to Look For in a Solution Provider

Unleashing the full potential of pervasive wireless requires organizations to embrace the concept of pervasive wireless. A virtual wireless solution can meet many of the challenges organizations will face migrating to pervasive wireless. The choice of solution provider can be difficult with the number of vendors in the wireless industry today. The following criteria can be used to guide organizations considering a virtual wireless LAN solution:

- **Scalable solution:** The next wireless solution deployed for most organizations will become primary access networks. The solution needs to be able to scale to levels far higher than traditional controller-based solutions.
- **Integrated wired and wireless solution:** Despite the shift to pervasive wireless, there is no actual all-wireless network. All traffic from the wireless access network will pass over a wired core. A solution provider with integrated wired

and wireless experience can provide a consistent user experience across the network.

- **Best-in-class centralized management console:** Since the wireless network will take on increased importance, a robust management console is required to provide the necessary visibility into the network.
- **Integrated security:** More and more corporate workers use wireless devices for critical business applications. The wireless network needs security integrated into the solution to ensure a high quality but secure experience.
- **Optimized for the virtual computing era:** A fourth-generation wireless LAN solution needs to be designed and built specifically for this computing era. A retrofitted solution will not meet security and scalability requirements necessary to enable pervasive wireless.
- **Strong vertical solutions:** The provider needs to understand how wireless can be used to solve business challenges. This requires strength in verticals that can best leverage vWLAN.

## V: Conclusion and Recommendations

The evolution of wireless technology combined with an increase in consumer technology and a growing mobile worker population has created a “perfect storm” that is transforming enterprises faster than ever before. While the vision of pervasive wireless has been on the horizon for many years, the technology to support it has not been available until recently. Fourth-generation vWLAN is the next networking technology that can accelerate the transformation of the enterprise. Virtual WLAN will allow companies to improve the productivity of mobile workers while maintaining a high quality, almost-wired experience. Additionally, organizations that adopt vWLAN will realize a significant cost-savings benefit, enabling the vision of pervasive wireless to become a reality. To get started, ZK Research recommends the following:

- **Embrace the vision of pervasive wireless:** Freeing corporate workers from the limitations of the corporate desktop will allow workers to collaborate better and streamline processes, ultimately creating a higher level of productivity. Pervasive wireless can also save a significant amount of money, since costly wired ports can be replaced with a robust wireless solution. Companies that embrace this vision will gain a distinct competitive advantage.
- **Evaluate solution providers on fourth-generation wireless criteria:** Test the solution against metrics such as number of controllers needed, total number of access points, quality of service, support for multimedia devices and how close it comes to providing a consistent user experience at all points in the network.
- **Evaluate a wide variety of solution providers, not just your incumbent:** Do the necessary homework to understand all the solution providers available today, not just the market leaders. In fact, it's commonly not the incumbent solution providers and market-share leaders that move technologies through market transitions. Test a minimum of four vendors when evaluating solutions to enable pervasive wireless.