

Wireless LANs – Poised for Untethered Growth

By Jeff Abramowitz, Executive Director, Wireless LAN Association

The wireless LAN industry has emerged as one of the fastest-growing segments of the communications industry. Year-over-year industry shipments more than tripled in 2000, thanks to the introduction of standards-based Ethernet-speed products brought to market by major players at average prices more than 30 percent lower than those for prior-generation products. Cahners-Instat foresees the industry growing from the \$1.1 billion of 2000 to \$5.2 billion by 2005, with significant growth potential beyond that.

This report summarizes the wireless LAN applications and market dynamics that have produced the growth to date, describes the challenges and the associated solutions on the horizon, and considers key industry growth opportunities.

Growing Adoption

The wireless LAN is an enabling technology, proven over the last decade in vertical applications such as recording of retail transactions and management of inventory. The many hospitals and universities that now broadly use the technology with standard PC platforms have dramatically improved the services they provide to staff, patients, and students. Wireless LAN installations are increasing productivity in the enterprise environment, and major corporations such as Microsoft have “unwired” their facilities. Around the world, road warriors and casual surfers flock to public hotspots in airports, hotels, convention centers, even coffee shops, where anyone with a wireless LAN card can gain access to the Internet. In the home, a wireless networking setup allows laptop users to access the broadband pipe from any room, and desktop users to access the Internet without drilling holes for cables.

Burgeoning Industry Participation

Wireless LAN opportunities across multiple market segments are attracting a growing number of industry participants. The players range from focused start-ups to Fortune 50 companies and represent a broad industry value chain. The current growth phase, for example, has been enabled by the proliferation of high-speed semiconductor chipsets from companies like Intersil, whose success has made next-generation products a target for new semiconductor entrants. The product space has seen a tremendous increase in the number of players across all market segments. Newcomers like Colubris Networks are vying for business with the major players in enterprise networking, like Cisco and Enterasys. All the major PC vendors now offer wireless LANs built into their notebook computers, and broadband modem providers like Alcatel have begun wireless-enabling their products. Taiwanese manufacturers have also dramatically influenced the industry landscape, sourcing worldwide retail vendors with cost-effective solutions.

For customers seeking software solutions beyond those offered by hardware vendors, companies such as NetMotion and Wavelink provide unique propositions for security, mobility, and network management. Software support for wireless LANs received a dramatic boost with the introduction of Microsoft’s Windows XP operating system with built-in Wi-Fi technology support (see “Well-Planned Technology Evolution” below). Users will find it easier to set up wireless LANs, and

transitions from work to home and public-access locations will become virtually seamless. In addition, the 802.1x support provided in XP will help network managers secure wireless LANs for enterprise applications.

Not that long ago, the wireless LAN service industry consisted primarily of product support from vertical market providers like Intermec and Symbol. A broad range of service and support-related businesses now exists to complement wireless LAN product sales. This includes not only the vendors and resellers supplying product, but also service organizations like SignaServices that specialize in wireless LAN support, and other companies supplying industry-specific troubleshooting tools. Broadband service providers like AT&T now support wireless home networking, and an entire industry – from property owners to aggregators – is being built around delivering wireless LAN public access to mobile users. Wireless LAN technology and applications are now taught and researched in universities; industry-training programs, such as the Planet3Wireless CWNE program, certify engineers as wireless LAN network professionals. Market research and conference firms now have focused wireless LAN efforts and are expert in tracking and presenting wireless LAN technology and applications to audiences worldwide.

Wireless LANs Step Outside

Wireless LANs are increasingly common in campus settings – but campus LANs are just one of several outdoor applications for technology whose roots are in-building. Most enterprise wireless LAN vendors offer solutions that allow customers to connect their networks between buildings using wireless LAN-to-LAN bridges; technology enhancements and directional antennas enable these links to work over distances up to 25 miles. Some vendors, like Raylink and Alvarion, also use wireless LAN technology to enable wireless ISPs to provide outdoor point-to-multipoint systems. With the stability of an established industry standard and the cost-effectiveness of an unlicensed, high-volume approach, these solutions provide attractively priced, high-bandwidth solutions where wires do not go.

Well-Planned Technology Evolution

An interoperable industry standard has been a primary driver of the wireless LAN industry's growth. While several flavors of wireless LAN technology are still found in the marketplace, the industry has converged on the standards sanctioned by the Wireless Ethernet Compatibility Alliance (WECA) for applications requiring interoperability. WECA builds certified interoperability test suites around international standards created by the 802.11 committee of the Institute of Electrical and Electronic Engineers (IEEE). The first WECA seal of interoperability, the Wi-Fi logo, refers to the 2.4-GHz, 11-Mbps technology known as IEEE 802.11b.

WECA will also provide a Wi-Fi5 seal of interoperability for 5-GHz products built to the approved IEEE 802.11a standard. Solutions at 5 GHz will provide higher speed and greater system capacity than existing 2.4-GHz solutions, but early 5-GHz customers will face some tradeoffs: higher cost, range constraints, and limited product support. In addition, the first generation of Wi-Fi5 products will not be interoperable with existing Wi-Fi products. However, future Wi-Fi5 products will likely support existing Wi-Fi products and may support high-rate 2.4-GHz technology as well. The industry therefore has a potentially smooth migration path to meeting future high-performance requirements.

Additional IEEE efforts to increase the speed, security, and quality of wireless LAN service are now at varying stages of specification and implementation. The best-known efforts are those of the 802.11g committee charged with extending the 2.4-GHz technology to higher speeds while maintaining backward compatibility with existing Wi-Fi solutions, and those of the 802.11i task group addressing wireless LAN security.

These planned technology changes and new standards represent just a few pieces of the technology evolution puzzle. Semiconductor and product manufacturers continue to drive toward new architectures and new levels of integration to decrease size, cost, and power consumption while adding the new features and functionality the market demands. Look for increasingly differentiated solutions that enable high-throughput, high-capacity, managed enterprise networks, and the low-cost, low-power networks needed for handheld and consumer implementations.

Overcoming Industry Challenges

While clear customer demand and the strong track record of wireless LAN products and services support the bold promise of wireless networking, the industry continues to address customer barriers. Security concerns have become the most visible challenge to wireless LAN growth in the enterprise market. In the consumer space, education is required to explain the uses and benefits of wireless home networking. Customer confusion threatens to slow market growth across all market segments. Fortunately, these challenges are well known within the industry, and the standards bodies and vendors are working quickly to address them.

Security is an obvious industry challenge because, unlike transmissions through a wired system, signals communicated over a wireless LAN can be compromised by unauthorized eavesdroppers without physical proximity. The original 802.11 committee understood the scope of the potential security challenge (and the export laws at the time) and designed a base from which layered security would be built. The media has helped highlight the fact that most companies operate wireless LANs without employing any security, and that customers relying solely on the original Wi-Fi specification are vulnerable to hackers.

Secure wireless LAN solutions are commonly available, but one size does not fit all, and customers must choose an approach based on the value of the information they are protecting. Most of the enterprise solutions involve existing VPN technologies that can be built into or on top of wireless LAN products. Smaller wireless LAN implementations find the WEP standard or the common 128-bit extension of WEP sufficient. Microsoft's new Windows XP operating system should simplify the security decision-making for some, because it incorporates the new 802.1x-standard VPN security technology for authentication and encryption key exchange. We can expect similar upgrades and add-ons to other operating systems as well. Looking forward, the IEEE 802.11 committee recognizes evolving communications requirements and is working to fortify the standard for the future.

Consumers are increasingly aware of the benefits of home networks, particularly when sharing a broadband connection. The steep drop in wireless LAN product prices and the convenience and mobility benefits of wireless connectivity have spurred rapid growth in wireless LAN retail sales, but mainstream adoption requires more market education and products that are easier to use.

Vendors, aware of these challenges, have begun targeting consumers with specific product and marketing efforts.

Customer confusion is always a challenge in a rapidly growing industry in which the standards are evolving, new players clamor to make their voices heard, and new applications emerge at a remarkable pace. Adding to the confusion is some application overlap between wireless LANs and wireless PANs like Bluetooth, which are principally short-range cable replacements. Wireless LAN-based public access encroaches on the broad coverage model typical of wireless WANs. Finally, in the enterprise, customers must choose whether to deploy the established Wi-Fi technology soon or wait until the next-generation 5-GHz technologies (IEEE802.11a or HiperLAN2) become more widely available in mid-2002.

Fortunately, resources have grown with the market to provide customers with explanations and solutions that meet their needs. These include websites, magazine articles and reviews, trained service providers, and market-research firms focused on providing customer information. One great resource is www.wlana.org, the website established in 1996 by the Wireless LAN Association (WLANA) that serves as an information aggregator for the wireless networking industry.

Growth on the Horizon

Today's wireless LAN devices are primarily network adapter cards for PCs and Access Points – devices that serve as the entry point for communication with the network. As both the wireless industry and wireless applications grow, a wider variety of products will become enabled for wireless LAN, and entire new product categories will develop.

For business, wireless LANs provide a unique convergence opportunity for the voice and data networks. The wireless LAN infrastructure can be used for a mobile PBX handset, building pagers, and more. In the home, applications will move beyond traditional computer networking, as voice, audio, and video are shared among wireless LAN-enabled phones, MP3 players, web cameras, interactive televisions, game players, handhelds, and more. Grandparents will use wireless Internet cameras to interact with their grandchildren across the miles. Cars equipped with MP3 players will capture files wirelessly from a home server – or from an Internet “filling station.”

Summary

The market demand for wireless LAN-enabled solutions is firmly established and the growth prospects are spectacular. The long proving cycle for the technology has produced an industry confident in its ability to deliver solutions. Participants – both well-known players and start-ups – are rapidly introducing new products and services. Visionaries who foresaw the promise of the technology have established a standards committee (IEEE 802.11), an interoperability alliance (WECA), and a trade association (WLANA) that will continue providing the essentials of industry infrastructure in a high-market-growth environment. These factors, and the compelling wireless communications applications of the future, are certain to fuel the untethered growth of the wireless LAN industry.

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