WLANA
The Wireless LAN Alliance

Wireless Local Area Networking:
ROI / Cost-Benefit Study

Executive Overview
10/98

Sponsored By The Wireless LAN Alliance (WLANA): WLANA is a non-profit industry alliance of leading worldwide suppliers of wireless local area network products and technology dedicated to promoting increased knowledge of wireless LANs through market education. www.wlana.com

Conducted by Tech Research (Mt. Laurel, NJ): 4305 Tarnbrook Drive, Mt. Laurel, NJ 08054; TCHRESCH@AOL.COM, Sonina Velasquez

Executive Summary

A fundamental challenge facing information technology (IT) decision makers is identifying and implementing architectures, technologies, and processes that reduce the total cost of ownership (TCO) of corporate networks—one way is the wireless LAN. Based on the results of this study, we believe that if companies understand the true costs and economic benefits of wireless LAN solutions they will generate quicker return on investments.

Currently the wireless LAN is not a replacement for the wired infrastructure, but it is a significant complement to what currently exists. Schools, manufacturing companies, hospitals, and offices purchase these wireless LAN systems for two predominant reasons: they are seeking an increase in user productivity and IT team productivity.

Companies that integrate or upgrade with these systems will stretch IT resources further and be able to reap economic and business benefits sooner than companies taking a wait-and-see approach—especially now that a solid standard exists for wireless local area networking. As a result of this standard and higher performing or higher speed systems, tomorrow's enterprises will likely have a mix of wireless and wired LAN systems.

Interviews for this study were conducted with wireless LAN users in the following industries:

- Education (In-building K-12 and University/College connectivity)
- Healthcare (Point of Care)
- Manufacturing (Production/Distribution/Maintenance/Shipping/Receiving)
- Retail (Point of Sale)
- Financial/Office -Automation (Stock Exchange, Banking, Consulting)

Major Findings

This Wireless LAN Cost of Ownership report is focused on the results of a detailed end-user survey to identify cost of ownership and tangible and intangible gains in using wireless LAN technology. It is apparent that the technology is taking its place as a viable alternative and/or complement to wired LANs and for new strategic applications.

- 89% of the companies experienced a successful implementation.
- 92% of respondents interviewed believe there is a definite economic and business benefit after installation.
- 92% of respondents reported that they will continue to deploy wireless technology in their network through 2000 because of the benefits experienced by end users and/or IT staff.
- Payback was less than one year, across all industries surveyed

The survey combines both telephone and written responses from 34 organizations. (See Scope of Study for more details). The survey consisted of both open-ended and multiple-choice questions. It was designed to provide the Wireless LAN Alliance (WLANA) with as broad a response base as possible regarding specific costs, attitudes and experiences with their overall wireless LAN ownership. All of the respondents involved subsequently completed a more extensive, follow-up written survey. Companies, schools, and medical facilities were assured anonymity. The analysis that follows identifies only by industry category and reports the data in the mean.

Some important findings are listed below:
Real-time Access to Information
One of the consistent findings of this study was how end-users benefited from real-time information. In

fact, 97% of respondents said they either strongly agree or agree that the wireless LAN contributed to the speed in which they completed a task requiring real-time or near real-time access to information.

Cost of Ownership

The study compared the costs of 34 wireless LAN installations. Costs for applications, outsourcing and network management are critical factors that need to be considered before the wireless LAN can either supplement the wired LAN or replace it as a wired LAN alternative. These savings are substantial from the viewpoint of manufacturer, retailers, hospitals, schools, and financial organizations. A wireless LAN enables them to provide better quality goods, at reduced costs, in a significantly less time.

On average, the total cost per user was found to be $4550 for a *wireless LAN solution*. This includes the costs identified below (Note that the WLAN Hardware/End User Devices category includes the computing platform used, which was generally a handheld or laptop computer.) Wireless LAN infrastructure and end user devices account for the highest percentage cost out of this total. The percentages for wireless LAN expenses, by category, were as follows:

WLANA Hardware/End User Devices: 50%
Monthly expenses: 1%
Management expenses: 16%
Application development expenses: 16%
Outsourcing: 16%
Downtime: 1%

Economic Benefits

With large investments in wireless LAN technology at approximately $300,000 to $4.2 million dollars per year, we clearly realize and sympathize with the managers that have been struggling to quantify the benefits that derive from wireless LANs. <u>Organizations implementing an average of 300 client cards reaped annual savings of up to $4.9 million, which translated into per user savings of $15,989</u>. As the wireless LAN solution is implemented on a large scale, these savings will eventually trickle down to the consumer.

Payback

Across all industries, the wireless LAN paid for itself within 12 months time. This is with all economic benefits considered. The payback period of this investment is the period of time required for the cumulative cash flows due to increased productivity, organizational efficiency and extra revenue/profit gain to equal the initial investment.

	Retail	Manufact.	Healthcare	Office Automation	Education
Benefits per company (millions $)	5.6	2.2	.94	2.5	.5
Costs per company (millions $)	4.2	1.3	.90	1.3	.3
Payback (# of months)	9.7	7.2	11.40	6.3	7.1

OVERVIEW BY INDUSTRY

Education
With Wireless LANs in place, respondents cited a more efficient use of space, and more in-class

productivity. At most education sites, the access point was located directly in the wiring closet or in a lab. With a wireless LAN, only the access point needs a wired network connection. Classroom or lab computers were connected to the access point via radio frequency.

K-12 schools needed a way to save money on network and computer costs. The Education Rate (E-rate) with 10% to 90% savings was available, but they needed even more ways beyond this to save. With wireless LANs they were able to save money by buying fewer computers. The solutions ranged from using cart-mounted computers wirelessly hooked to the wireless LAN. The carts could be moved to the classrooms where they were needed. The schools saved money by buying fewer computers as well as wiring to a central hub.

Wireless LANs turned out to be very inexpensive on a per-student basis. Wireless infrastructure costs for the educational sector averaged $2308. In this study 1345 students benefited from the wireless solution which in an average configuration included 25 access points and 112 computers equipped with wireless adapters. The savings can be attributed to the utilization of cart-mounted computers and fewer network drops as a result of the wireless LAN. With carts, fewer rooms would have been required to be networked and populated with computers.

Also, since many of the schools had a mandate to get students on the Internet to access more or better learning activities and since the wireless system served as a tool to make this happen, a very fast and easy installation was required. Wireless LANs met their needs as well. In this study students in the university setting demanded access to LAN resources from dormitories, classrooms, and throughout campus. Wireless LANs were being used to help students be more mobile and the schools to reduce network costs and connect remote locations to central buildings and servers. In the university environment providing a wired connection was extremely expensive, especially when it involved historical buildings—running cable through ceilings and walls was cost-intensive. Running wire through ceilings and walls in buildings at one site was going to potentially disturb asbestos insulation, forcing a removal process estimated to cost over $90,000.

Healthcare
With fast-rising healthcare costs, reimbursement and ROI are key to the requirements of IT investments in the medical industry. Healthcare spending in the U.S. has grown from $280 billion in 1981 to more than $1.5 trillion in 1997 and currently accounts for about 14% of the total gross domestic product.

With healthcare costs increasing at a rate of about 5% per year, cost containment is an important issue. Hospitals are centralizing laboratories, reducing costs, and increasing their use of automated technology. The wireless LAN has shown to meet the technology and organizational needs of healthcare companies today by decreasing the length of hospital stay, speeding diagnostic and case analysis time turnaround, reducing hospital labor, procedural costs, documentation, and scheduling time.

Manufacturing/Warehouse
Warehouse workers are increasingly demanding mobile scanners or pen-based computing tablets for inputting and accessing data in real-time. These devices are linked to mainframes or servers that usually have a software application running on them such as inventory collection, order fulfillment, and shipping/receiving applications. By connecting to inventory records and purchase orders, companies reduce the inefficiencies of transferring numbers through paper forms.

Wireless LANs connected to automated, handheld computers on manufacturing or factory floors are a viable alternative to wired LANs. Laying cable in these environments proved cost prohibitive, or not feasible because of the size of the warehouse. Also changes in assembly lines are frequent and many employees do not work in any fixed location for one straight month. In this study, we have seen that workers and management in the manufacturing environment need instantaneous access to accurate information so they can better track orders, production runs, and production quantities in real time.

Production

Wireless LANs automated the production, maintenance, and troubleshooting (repair) process at production bays of a foundry, production lines of an automotive manufacturer, and the outside work area of an aircraft manufacturer. The use of production planning and control software combined with wireless LAN technology illustrates the positive effect of this specific IT on an organization. A typical medium-sized to large manufacturing firm must stock, control and ensure the availability of thousands of items (end products, parts, and raw material). Further, production of the parts and raw material must be coordinated to ensure that the firm meets order commitments and production plans. Using manufacturing software with automated inventory status reporting, order processing, production scheduling, and invoicing features, made it possible for companies to control complexity. But in this study, we found that having a wireless LAN connected to this software enabled operators to go beyond second-guessing the age of the information coming over the wire. It appeared in real-time or near real time. This combination of hardware and software reduced the control and coordination and associated costs.

Retail

The retail industry category in this study comprised a collection of segments from diverse businesses, such as restaurants, specialty stores, prepared food stores, and military stores that vary in the types of items they sell and the market size for the items. But, they all sought faster rates in getting customers through checkout and totaling orders, and faster receipt of goods, and taking inventory. In retail establishments considerable effort is taken to attract customers, and reduce long lines.

Wireless LANs also contributed to the good health of retail establishments. Wireless POS cash registers and bar code client devices provided access to store inventory and pricing information. Scanning had a high impact on productivity at checkout through improvements due to easier price changing, and price removal, price identification. For example, price changes can be recorded in a central database at the store rather than on each item.

The wireless LAN infrastructure provided critical decision-makers in retail with real-time information on the ordering, collection, distribution, and sale of goods. The wireless network offered them a higher initial purchase price, but reduced support costs and increased checkout productivity and flexibility.

Financial

The financial/office automation category in this study comprised a collection of segments with varying businesses, such as banking, stock trading, consulting, auditing, and the office areas of a technology firm. Office automation was a goal for the consulting, auditing, and technology firm. All of these firms face come under considerable competition. Keeping up with the competition as well as offering new services are paramount.

In almost every instance the cost conscious system manager chose not to standardize exclusively on this new technology. This is because doing so required a large investment in changing the nearby network infrastructure. Many system managers were attracted to the wireless LAN for its flexibility, easy installation and, in the case of the stock exchange participant, mobility.

In the case of banking, the wireless LAN enabled account representatives and tellers to provide better service to customers and has been used to support a plethora of new transaction processing services. The auditing and stock trading organizations were just as, if not more data-intensive environments, characterized by volumes of accounting, analysis, and statistical data. The auditing firm was concerned about the quality of business generated by auditors, as measured, for example by the level of engagements handled by the company. But all these companies must be able to predict risks and risk factors and facilitating group collaboration is critical for reaching that goal. In the financial area, the wireless LAN saved hundreds of hours because group collaboration was easier. Individuals within these organizations

4

are increasingly turning to portable computers to communicate with the home office or master server for various functions. The auditor tied to the home office through a portable wireless LAN can serve a customer much more effectively than by dial-up lines, as can sales people and consultants working or collaborating in a conference room.

Scope of Study

The cost of owning a wireless LAN consists of infrastructure and software costs, client device costs, monthly costs, power costs, downtime costs plus all of the related management and support costs. Identifying management costs is a complex task. Management costs can include network infrastructure planning, training, troubleshooting and repair, and hardware management.

There are various types of criteria used to determine the cost savings of wireless networking equipment. We looked at business benefits and economic benefits. The main way in classifying technology benefits is to analyze how it assists in measuring and monitoring them, with a perspective to controlling and maximizing any positive effects of the change. There are criteria for measuring the benefits on a new system or a system already in place with an upgrade.

The measuring techniques in this study varied slightly depending on the benefits sought and the application that used the wireless LAN. Wireless LAN total cost of ownership must be derived from across a range of applications. However, there is always the one constant, that there is a history dating back to a time before the system was implemented. Meaningful analysis of the effects of the change is undertaken here.

This study focuses on radio-frequency-based systems. These wireless RF LANs compliment wired LANs, providing installation flexibility in difficult cabling situations, and user mobility. The wireless technologies used to support data transmission over short distances in buildings and without physical connections include radio waves and infrared light. The radio frequency (RF) in-building wireless LAN products are designed around radio technology and protocols using spread spectrum modulation techniques (Direct Sequence or Frequency Hopping).

This study looks at the cost of ownership of *in-building* RF LAN products that operate within 100 to 3000 feet of an access point.

The study involved in-depth interviews with wireless LAN customers. _Note:_ This study involved WLANA customers, as well as customers of several other wireless LAN vendors who are currently not in the WLANA organization.

The Cost of Ownership study encompassed a phone-administered interview. Tech Research asked participants about the costs and benefits of wireless LAN ownership and the difference it is making in end-user and IT staff work and within the organization.

Each participant was interviewed over the phone at his or her office. The interviews generally lasted between 40 and 60 minutes. The length and quality of answers coming from the interview depended on the participant's experience/contact with the wireless LAN system and/or contact with people using the wireless LAN.

Respondents were knowledgeable individuals regarding the subject matter. The administrator probed for detailed information and/or clarified questions at times to maximize respondent understanding and yield complete answers for the study. The questionnaire contained no questions leading to one conclusion or another. The questioning allowed end-users to speak in their own words and reveal their thoughts surrounding the purchase process, ideas of ROI of the wireless LAN, costs and the benefits associated with wireless LANs.

After the phone interview answers were documented and faxed or mailed to the participant for confirmation. We told participants that by answering the phone interview/faxed/mailed questions about their experiences with wireless LANs that it will help in influencing the generation of a report on *Cost of Ownership of Wireless LANs* that will address the cost savings and benefits of wireless LANs.

The faxed/mailed questionnaire was usually returned within 2 to 10 working days. The faxed/mailed questionnaire was easy for participants to understand and mark up. In the case of 85% of the respondents the faxed questionnaire forced them to do research into their notes or invoices on the subject.

The WLANA organization provided a gift incentive for participation—in this case it was a Palm Pilot Organizer. After the interview process was over it was clear the incentive was not only the gift, but also the ability to see their costs and economic benefits written out for them, a tool they could use at a later date for cost justification of more equipment. Both provided incentives to participate, answer more questions and/or answer questions more thoroughly.

Because the sample size is small (n=34) the possibility that inadequate information and the probability of error is high. However because the feedback during the phone interviews and from faxed questionnaires were consistent in nature, they provided an adequate indication as to what general trends were. Due to data collection techniques at the personal interviews we were able to get higher quality data than anticipated.

Not every cost savings derived from using the wireless LAN was quantifiable for participants. They are real however, and no less important. Many of these are related to organizational efficiency and network availability.

Standard editing and coding procedures were utilized. Simple tabulations and cross tabulations were utilized to analyze the data.

We are grateful to all participants for their time. We value their participation and thank them for their cooperation. We hope this study will provide information that is useful to current and future wireless LAN technology adopters.

COO Survey Respondents

Our research was based on the experience of small, medium, and large enterprises in the Healthcare, Manufacturing/Warehouse, Retail, Education, and Financial/Office Automation industries. The results should be interpreted as reflecting viewpoints indicative of a part of the larger wireless LAN installed base. Our intention to deliver a broad cross-section of the representative industries with applications conducive to wireless LANs was generally successful, although not equal to the population represented. Survey findings should be interpreted accordingly. The breakdown of participants by industry was:
Education: 23% (8)
Healthcare: 23% (8)
Manufacturing/Warehouse: 21% (7)
Retail: 15% (5)
Financial/Office Automation: 18% (6)

This study primarily features customers who have wireless LANs installed at one or more sites and had completed deployment or were still in the process of upgrading.

ABOUT WLANA:

October 1998

About WLANA

  The Wireless LAN Alliance (WLANA) is a non-profit industry trade association formed to increase awareness and encourage the adoption of wireless LANs products and technologies.

The Alliance maintains an educational web site at www.wlana.com with industry white papers, end-user case studies and links to related topics and member web sites.

Members

The Wireless LAN Alliance membership is comprised of 11 leading worldwide suppliers of wireless local area networking products and technologies.

3Com Corporation www.3com.com
Aironet www.aironet.com
Bay Networks www.netwave-wireless.com
BreezeCom www.breezecom.com
Cabletron Systems, Inc. www.cabletron.com
Harris Semiconductor www.semi.harris.com
Intermec Technologies, Inc**.** www.intermec.com
Lucent Technologies www.wavelan.com
Proxim, Inc. www.proxim.com
Raytheon Wireless Solutions www.raylink.com
Symbol Technologies www.symbol.com

Contact Information

Media Contact	**Alliance Contact**
Rich Henderson	Mack Sullivan
Media Relations	WLANA Director
Email: rich@papr.com	Email: mack@wlana.com