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Welcome

AFTER PROVING THEMSELVES IN VERTICAL MARKETS SUCH AS HEALTH care, education, and retail, wireless LANs (WLANs) are beginning to make inroads in general business-computing environments. According to a recent META Group study, 29 percent of 435 enterprises surveyed in the US had deployed WLANs as an adjunct to the campus network. Furthermore, an additional 44 percent indicated they would deploy WLANs within the next 24 months.

In fact, over the past year, there has been increased adoption and acceptance of WLAN technologies, not only within the enterprise, but also within the home, public access, and embedded device markets. Thanks to improvements in performance, security, interoperability and manageability, as well as decreases in price, 2002 is shaping up to be the year of the wireless LAN.

The ABGs of Wireless

802.11b—The battle between wireless technologies such as Bluetooth, HomeRF, and the IEEE 802.11b standard is effectively over. With its better throughput and longer range, 802.11b—which operates in the unlicensed

BY
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to the **Wireless** Enterprise

2.4-GHz frequency spectrum—is now well established in both corporate and home wireless markets. Wireless “hot spots” based on 802.11b are also popping up in hotels, airports, convention centers, and coffee shops worldwide, making it an important, emerging market for service providers as well.

Interoperability of 802.11b products from different vendors is ensured by an independent organization called the Wireless Ethernet Compatibility Alliance (WECA), which identifies compliant products under its “Wi-Fi” Brand. With Wi-Fi membership boasting more than 140 companies, spanning component manufacturers, equipment vendors, and service providers, the future of the 802.11 standard is secured.

802.11a—Multiple standards are currently competing for dominance in the high-bandwidth WLAN market. To date, the IEEE 802.11a standard, which offers nearly five times the bandwidth of 802.11b, has achieved substantial momentum, with initial products already available in the market. HiperLAN2 in Europe and HisWANa in Japan may also reach critical mass in the 5-GHz frequency, although neither standard currently has available products.

WECA certification for 802.11a interoperability will ultimately help the new standard gain widespread adoption in the same way it has bolstered the penetration of 802.11b products. While 802.11a will no doubt be the primary global standard for 5-GHz frequency,

More enterprises adopt wireless LANs as technology matures.

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don't expect the number of certified products to reach Wi-Fi (802.11b) levels in 2002. As vendors roll out 802.11a products, enterprises should give careful consideration to platform stability and performance, as well as interoperability and standards compliance before deploying 802.11a products.

802.11g—A late entrant into the 802.11 family, 802.11g, like 802.11a, boasts a top data rate of 54 Mbps but operates in the same unlicensed portion of the 2.4-GHz spectrum as 802.11b. While this makes the 802.11g backward compatible with 802.11b devices, the new standard will also be limited to the same three channels and crowded 2.4-GHz band as 802.11b, creating possible scalability and interference issues.

The 802.11g standard won't be ratified until late 2002, with products not available until 2003, giving 802.11a products a substantial lead in the high-bandwidth wireless market. Early adopters of 802.11g will likely be organizations with a significant investment in 802.11b looking for a performance boost without 802.11a. For ultimate investment protection and design flexibility, vendors are designing dual-band devices—modular platforms that will operate in 802.11b (2.4 GHz), 802.11a (5 GHz), and, when ready, the 802.11g standard (see "The Once and Future WLAN," page 45).

For now, the only two viable choices are between 802.11b and 802.11a.

Choose Your Standard

Network managers struggling with the decision to deploy 802.11b today or wait for certified 802.11a products should concentrate on the value gained from the deployment coupled with the bandwidth requirements of the application. If the application doesn't require bandwidth in excess of a shared 11-Mbps segment, users will continue to be well served by 802.11b products. In fact, most applications that leverage today's wireless LANs—such as e-mail—typically do not have a significant bandwidth requirement beyond that which is



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currently available. If more bandwidth is needed, network managers can also achieve higher per-user throughput with 802.11b by installing more access points to reduce the number of users in each coverage area.

Network managers should also consider the following requirements when deciding between 802.11b and 802.11a deployments:

- **Interference sources:** If an environment has a lot of interference sources in the 2.4-GHz frequency band, such as Bluetooth devices or non-802.11b wireless phones, then 802.11a (5 GHz) may be the better choice.
- **Need for channels:** 802.11b offers only three nonoverlapping frequency channels; 802.11a offers eight for more flexibility in structuring coverage areas.
- **Installed base:** The more 802.11b clients installed, the greater the need to have access points that support 802.11b.
- **Number of "road warriors":** If WLAN users operate in "hot spots," at home, and in other locations where 802.11b is predominant, they will require 802.11b in the enterprise, too.
- **Types of applications:** 802.11b is better for transaction-intensive applications; 802.11a is better for data-hungry applications.
- **Cost:** 802.11a systems could cost 20 to 30 percent more than current 802.11b products and may have a higher deployment cost due to different RF characteristics of the 5-GHz frequency.

Longer term, as WLANs become an increasingly integral adjunct to the corporate network, higher bandwidth 802.11a networks will be the logical choice because of the needs of future applications—such as wireless videoconferencing—and the desire to optimize the end-user experience. Users with existing 802.11b deployments that don't have a requirement for additional

bandwidth won't have to upgrade beyond the current state.

Given the difference in operating frequencies, 802.11b and 802.11a products can coexist within the same environment, allowing users to move from one to the other by switching clients. While this approach offers additional flexibility, an enterprise must conduct comprehensive site surveys for each technology to guarantee adequate network coverage. Each frequency has different signal strength, interference, and reflection characteristics, and each implementation must be optimized for different requirements. (For more information on how to conduct a site survey, see page 36.)

Show Me the Money!

The days of technology for technology's sake are long past. While technophiles can revel for hours explaining the idiosyncrasies of indoor signal-path loss, or the variety of extensible authentication protocols used to secure wireless links, it will do little to convince businesses to deploy the technology. Business managers will not fund technology adoption without a tangible return on investment (ROI). As a result, technical managers must get better at quantifying the return to the business associated with new technology adoption (see sidebar, opposite page).

If an information technology (IT) organization spends a lot of time moving people around or adding people to the network, it can realize a savings in time and money with a wireless enterprise deployment. Also, workers can be brought into temporary workspaces more rapidly using wireless than in a wired environment.

Thus, the project team must assess the demographics of its user base and segment accordingly based on the value gained from increased mobility. This segmentation will vary dramatically based on a user's specific role within the organization. For instance, managers and office workers who attend a lot of meetings but still need to stay in touch with e-mail and the corporate intranet can benefit from wireless connectivity. In contrast, desk-bound employees, such as receptionists and some back-office

Independent Study Cites Wireless Productivity Benefits

The advantages of WLANs are widely touted: They offer users anytime, anywhere network access and help IT departments cut cabling costs and simplify labor-intensive installations. But in today's budget-tightening economy, the benefits of such technologies must be tested and proven before they are implemented. To that end, NOP World-Technology, an independent research firm based in London, recently conducted a WLAN benefits study with end users and IT decision-makers at more than 300 US-based companies and organizations ranging in size from 100 to 10,000 and more employees. The report found that, overall, WLAN technology is indeed living up to its promise of greater efficiency and a significant ROI.

Respondents to the study estimated that wireless networking had saved their organizations an average of US\$164,000 annually on cabling costs and the labor associated with workstation adds, moves, and changes—more than 3.5 times the amount IT staff had anticipated. These savings did not include the financial benefits of increased



productivity, which can boost an organization's return on its WLAN investment by thousands, or millions, of dollars.

The NOP World study found that, on average, WLANs enable end users to be connected an hour and 45 minutes more per day, which translates to a 22 percent productivity gain per person. Because WLANs are best suited to communications applications, the highest productivity gains across all sectors are seen in e-mail and Internet-based applications. Also, wireless "hot spots" such as wireless-enabled airports, hotels, and coffee shops, where employees can log on to their company network with laptops or handheld computers, help turn what would otherwise be downtime into productive work hours.

Through a combination of cost savings and productivity gains, the survey reports an annual estimated ROI of US\$4,550 per employee. For more on the NOP World study, visit newsroom.cisco.com/dlls/tln/wlan/wlan_benefits.html.

employees, will gain little benefit from anytime, anywhere connectivity beyond basic cable replacement.

Knock. Knock. Who's There?

The security community and press have loudly proclaimed the potential threat WLANs pose to unsuspecting enterprises. While IT professionals, product manufacturers, and security gurus are increasingly working together to develop an action plan for securing WLAN deployments, it is important that network managers understand the issues and risks, and proactively approach establishing a comprehensive WLAN security policy (see "How to Build a Secure WLAN," page 40). When contemplating what security measures to take, consider what is emerging from the IEEE 802.11 Task Group i, which is defining the WLAN security standard that all vendors can support, as well as vendor-specific security solutions. As with any security policy, a multilayered approach will provide the best guarantee of overall integrity.

Cutting the Cord

While the payoff for going wireless can be great, the challenges associated with successful WLAN deployments should not be underestimated. Network managers should first conduct a comprehensive analysis of the potential ROI—both from the standpoint of increased productivity and the potential cost savings from simplified network adds, moves, and changes. Product selection should be centered on standards longevity, along with vendor commitment to further product innovation. Managers should take the imple-

mentation process seriously and conduct comprehensive site surveys, formulate an actionable security plan, and deploy products to meet optimal design characteristics.

While WLANs have made significant inroads into the corporate community, we are currently only at the threshold of what will clearly become an industry-wide phenomenon. Despite the market pressures to adopt and deploy emerging technologies, a pragmatic approach to technology adoption will best position businesses through 2002 and beyond. ▲▲

INCREASE YOUR INTERNET QUOTIENT



To learn more about the benefits of WLANs—and three more ways to use the Internet to keep your business competitive—check out "Leading Edge" in iQ Magazine, the Cisco Internet business strategy publication for senior executives, at cisco.com/go/iqmagazine/leadingedge.