

# **WIRELESS LOCAL AREA NETWORKS: ULTIMATE FREEDOM IN TEACHING AND LEARNING ANYTIME, ANYWHERE WITH TECHNOLOGY**

Dulal C. Kar\*

## **INTRODUCTION**

Internet, a giant structure of wired networks connecting all computers on-line all over the world, is a vast source of information. Because of easy access to Internet, a computer user is no longer restricted for information by the limited capacity of the stand-alone machine or by the aggregate shared capacity of the home local area network (LAN). The recent development in Wireless LAN (WLAN) technology has extended all Internet services to mobile users anywhere, anytime. Many academic institutions after some experimental phase are embracing the technology to provide ultimate freedom in accessing and using information for their students, faculty, researchers, and staff. It is changing the environment, culture, and life for the academic communities in many places in a campus such as classrooms, labs, libraries, and dormitories in an academic institution. Students and educators are deriving many benefits from the technology as it provides mobility, flexibility, and versatility to the user. In this paper, we discuss usefulness of the Wireless LAN technology in an academic institution, its scopes for academic uses, and some solutions to cope with some of its limitations.

## **WIRELESS LAN TECHNOLOGY**

Wireless Local Area Networks are essentially extensions to traditional wired local area networks (Baldazco, 1995; Boyle, 1996). A device called an access point is attached to a traditional LAN through an Ethernet port. Through the access point, mobile or fixed wireless workstations can communicate with any host on the traditional wired network infrastructure. Each wireless workstation is installed with a wireless LAN adapter that communicates with the access point using radio waves or microwaves. The data transmission rate of current WLAN adapters ranges from 2 Mbps to 20 Mbps, and the price of such adapters ranges from \$250 to \$800. An access point can be equipped with an outdoor antenna to provide coverage of long distance. The transmission range of most WLAN products is from 20 feet to 800 feet. On average, an access point can handle 20 to 30 wireless workstations. Installation of many access points on the traditional wired network is required to provide extensive coverage all around a campus. Ethernet ports in classrooms, dormitories, libraries, hallways, labs, etc. are used to attach access points. Other forms of Wireless technology are also available for networking as well.

---

\* Department of Computing and Mathematical Sciences  
Texas A&M University -- Corpus Christi, Corpus Christi, TX 78412

## CHANGING ACADEMIC ENVIRONMENT

Wireless LAN technology is affecting and changing academic environment in many different ways (Hills, 1999; Preston & Radulovic, 2000). Libraries in some academic institutions allow checkout of wireless workstations, so that a student does not need to sit in a crowded computing lab and do his/her work. Instead she/he can prefer some quite study room and sit with the wireless workstation and learn as he or she browses Internet for information. Students can go on online anytime, anywhere from green lawns, food courts, cafeterias within the campus at their leisure time if desired. Any science lab such as the chemistry lab or physics lab can co-exist with such an ad hoc computing lab in the same room. It does not require exclusion of one or the other. Access to information and data collection can simultaneously be carried out, for example, from a greenhouse or a biological experiment station. There is no need to schedule a class in a room with a wired LAN. Classes can meet anywhere. A surveying class, for example, can meet in outside in a field, and can still access Internet for information as well. Here are some specific examples on such effects and changes:

**Class Mobility.** Usually computer lab facilities in an institution are limited and may not be available for all courses for all or most of the time. Wireless LAN provides a welcome solution to such problems. A class can meet in any classroom, which can be turned to a computer lab with wireless workstations and a student can be an active learner who can access or share information whenever needed. In addition, in this environment, through the access point, an instructor can exercise single-point controlling and filtering of on-line information for the class as well.

**Class Flexibility.** Many courses taught on case studies of problems are usually scheduled in classrooms with special sitting arrangements and computing facilities for group study. However, many other courses do not require such arrangements for an entire term. Depending on the need, such a class is organized to create a group learning environment with round-table like sitting arrangements and next time the same class is organized for traditional delivery of lectures. Wireless LAN technology provides a great flexibility for such classroom environment with access to on-line information at the same time.

**Research Productivity.** With the aid of a wireless workstation at a research experiment station, research data can be collected and immediately uploaded to a central database. In the same way, research results can be downloaded at the site of the experiment for immediate comparison with the results of the current setup. Distant monitoring of an ongoing scientific experiment and the corresponding data collection from the experiment can be carried out now from anyplace. As a result, many frequent visits to the site of the experiment can be saved.

**Classroom Cleanliness.** Wireless LAN environment provides a clean computing lab environment compared to a traditional computing lab, as there is no need to

connect workstations with wires and power chords. Use of compact notebook or laptop computers in the class provides hazard-free environment. It is relatively easy to move around in such a class. Compared to a traditional wired computing lab, a class with wireless stations provides a instant computing lab environment that is more space efficient and provides better space utilization. As wireless workstations are laptops equipped with WLAN cards, they can be folded and put aside during non-computing class activities such as a test or a serious discussion of a topic or a lecture.

### **AVAILABILITY, LIMITATIONS, AND CONCLUSION**

Some academic institutions require students to buy a computer with a wireless LAN adapter card. In some institutions, wireless LAN adapter cards can be checked out for short-term use. Some academic institutions are making various efforts to provide their students a complete wireless workstation. Some are making wireless workstations available to students on checkout basis or on lease basis. Some institutions have cart services to the classroom with wireless workstations on demand basis. As prices of WLAN adapters are falling, perhaps students who can afford a computer would easily be able to afford a WLAN adapter for his or her notebook.

Speed is still a problem in a wireless LAN, which is often the cause of annoying delay of downloading of large multimedia document during a session of a class. Also an access point can be flooded by the requests of many operating wireless workstations causing a bottleneck effect when all users want to access the same time. A solution to this problem is to have more than one access point installed to serve the group of wireless workstations. Seamless roaming of mobile stations for Internet access is still an issue in some situations. The limited life of battery power of a current laptop or notebook computer is sometimes a problem for continuous use, particularly if a student has two or three consecutive classes to attend. Lighter and less power consuming portable computers are more desirable than the existing ones. The cost is still a deciding factor in deploying WLANs in a campus. Fortunately, like many computing products, the prices of WLAN products are going down every month. In many situations, as speed increases, wireless LAN will be cost-effective solution to information access with less wire, maintenance problems from anywhere, anytime.

### **BIBLIOGRAPHY**

- Hills, A. (1999). Bringing mobile computing to a university of 10000. IEEE Spectrum, 6, pp. 49–53.
- Baldazco, R. (1995, June). WaveLAN wireless LANs offer robust range, throughput, and roaming. Byte, 6.
- Preston, A. & Radulovic, P. (Ed.). (2000, August). Wireless technology at the University of Tennessee Campus [WWW document]. URL: <http://volnet.utk.edu/whitepapers/wireless.html>.
- Boyle, P.R. (1996). Free to roam. PC Magazine, 2.