<u>B2C Technology Story</u>

Web Summary:

The Wireless LAN
by Leon A. Enriquez

Reading Time:
8 minutes

Reader Benefit:
♦ Enhancing work demands and the need for mobility without sacrificing connectivity;
♦ Understanding the Wireless LAN and how it works;
♦ Typical FAQ on WLANs.

Work demands are compelling the need to be on-the-move in order to keep pace and be in-sync with rapid changes in the marketplace. Thus, mobile communications is even now, a daily necessity. The trends indicate that people are increasingly spending more time away from their office desks. At the same time, they need reliable access to corporate networks and the Internet. Enter the wireless local area networks or wireless LANs (WLAN) to empower the mobile generation through wireless connectivity.

The Wireless LAN
by Leon A. Enriquez

A just a casual observation will illustrate that work demands are making on-the-move, mobile communications a daily necessity. People are spending more time away from their office desks. At the same time, they need reliable access to corporate networks and the Internet. Enter the wireless LAN (WLAN) as a connectivity tool.

The electronic components of WLAN convert data packets into radio waves or infrared (IR) light pulses – and send these signals to other wireless devices, or to an access point that serves as a gateway to the wired LAN.

Most WLANs are based on the IEEE 802.11 and 802.11b standards for wireless communication between devices and a LAN. These standards permit data transmission rates of 1 to 2 Mbps or 5 to 11 Mbps respectively. These standards specify a common architecture, transmission methods, and other aspects of wireless data transfer so as to improve interoperability between multiple vendors' wireless devices.

The manufacturers of wireless LANs have a choice of a range of technologies to select when designing a wireless LAN solution. Obviously, each technology comes with its unique set of advantages and limitations. Let's look at a few options. *(See Box Story 1: Examples of Wireless LAN Technologies.)*

Wireless LANs use electromagnetic airwaves e.g., radio or infrared – to communicate information from one point to another without relying on any physical connection.

Radio waves are often referred to as radio carriers because they simply perform the function of delivering energy to a remote receiver. The data being transmitted is superimposed on the radio carrier so that it can be accurately extracted at the receiving end. This is generally referred to as modulation of the carrier by the information being transmitted. Once data is superimposed or modulated onto the radio carrier, the radio signal occupies more than a single frequency, since the frequency or bit rate of the modulating information adds to the carrier.

Multiple radio carriers can exist in the same space at the same time without interfering with each other if the radio waves are transmitted on different radio frequencies. To extract data, a radio receiver tunes in one radio frequency while rejecting all other frequencies.

In a typical wireless LAN configuration, a transmitter/receiver or transceiver) device is known as an access point, that connects to the wired network from a fixed location using standard cabling. The access point receives, buffers, and transmits data between the wireless LAN and the wired network infrastructure.

A single access point can support a small group of users. It can function within a range of about one hundred to several hundred feet. The access point antenna is usually mounted high. And so long as the desired radio coverage is within range, it may also be mounted anywhere that is practical.

End-users access the wireless LAN through WLAN adapters. WLAN adapters provide an interface between the client network operating system (NOS) and the airwaves via an antenna. The nature of the wireless connection is transparent to the NOS.

Examples of such implementation of WLAN adapters include: PC cards in a notebook PC or palmtop computers; adapter cards in desktop computers; or adapters integrated within handheld computer devices.

The WLAN solution provides an excellent way to extend the reach of local area networks (LANs). Instead of plugging into a wired LAN wall outlet, you can quickly connect to the corporate network through your PC and WLAN card for easy access to say, broadband data rates without wires.

Wireless LAN access zones at airports, hotels and other public places enable users to quickly connect to their corporate network via the Internet. At the same time, the capability of built-in security features offer the end-user secure and reliable access to network resources.

Box Story 1:

Examples of Wireless LAN Technologies

There are a variety of technologies to select when designing a wireless LAN solution. Obviously, each technology comes with its unique set of advantages and limitations as follows:

♦ *Narrowband Technology:*

A narrowband radio system transmits and receives user information based on a specific radio frequency. Here, narrowband radio keeps the radio signal frequency as narrow as possible just to pass the information. By carefully coordinating different users on different channel frequencies, undesirable cross-talk between communications channels is avoided.

For example, a private telephone line is like a radio frequency. Each home in a neighbourhood has its own private telephone line. As such, people in one home cannot listen to calls made to other homes. Similarly, in a radio system, privacy and non-interference are accomplished by the use of separate radio frequencies. The radio receiver filters out all radio signals except the ones on its designated frequency.

From a customer standpoint, one drawback of narrowband technology is that the end-user must obtain a separate license for each site where it is used.

♦ *Spread Spectrum Technology:*

Most wireless LAN systems use spread-spectrum technology – a wideband radio frequency technique originally developed for military use in reliable, secure, mission-critical communications systems.

Spread-spectrum is designed to trade-off bandwidth efficiency for reliability, integrity, and security. Here, more bandwidth is consumed compared to narrowband transmission. This trade-off produces a signal that is louder and easier to detect – provided that the receiver knows the parameters of the spread-spectrum signal being broadcast. So, if a receiver is not tuned to the right frequency, a spread-spectrum signal may appear similar to background noise.

There are two types of spread spectrum radio, namely, frequency hopping, and direct sequence.

1. *Frequency-Hopping Spread Spectrum Technology:* Frequency-hopping spread-spectrum (FHSS) uses a narrowband carrier that changes frequency in a pattern known to both transmitter and receiver. When properly synchronised, the end-effect is to maintain a single logical channel. Thus, to an unintended receiver, FHSS appears to be short-duration impulse noise.

2. *Direct-Sequence Spread Spectrum Technology:* Direct-sequence spread-spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or chipping code). The longer the chip, the greater the probability that the original data can be recovered, but more bandwidth is required. Also, even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can recover the original data without the need for retransmission. To an unintended receiver, DSSS appears as low-power wideband noise and is ignored by most narrowband receivers.

♦ *Infrared Technology:*
Another technology that is seldom used in commercial wireless LANs is infrared. Infrared (IR) systems use very high frequencies – just below visible light in the electromagnetic spectrum – to carry data.

Like light, IR cannot penetrate opaque objects. IR is either directed in a line-of-sight, or diffuse technology. Inexpensive directed systems provide very limited range (3 feet) and typically are used for personal area networks; and occasionally are used in specific wireless LAN applications. High performance directed IR is not practical for mobile users.

Box Story 2:

FAQ on Wireless LAN

What is a wireless LAN (WLAN)?
A Wireless Local Area Network provides all the functionality of a wired LAN, but there are no physical connections between network. Using radio frequency technology, a WLAN transmits and receives data over the air, minimising the need for wired connections.

What is IEEE 802.11 standard?
IEEE 802.11 is the standard issued by the Institute of Electrical and Electronic Engineers – and defines all aspects of Radio Frequency Wireless Networking – operates at a specified data rate of 1 and 2 Mbps.

What is IEEE 802.11b standard?
IEEE 802.11b is the standard that specifies a carrier sense media access control and physical layer specifications for 5.5 and 11 Mbps wireless LANs.

What is Ad Hoc mode?
Ad Hoc mode refers to a wireless network that may have of a number of stations without access points. They can share files and printer this way, but are not be able to access Wired LAN resources.

What is an Access Point?
An access point is a wireless LAN transceiver that acts as a central point that acts as a bridge between the wireless and wired networks.

What is Infrastructure mode?
Infrastructure mode is a network composed of stations and access points. It can connect the wireless LAN to a wired LAN, allowing wireless computers access to LAN resources, such as file servers or Internet connectivity.

What is Roaming?
Roaming allows the end-user to move around from one access point to another without breaking the network connection.

Is the wireless network only accessible through a notebook PC?
End-users can access the wireless network through hardware devices known as wireless adapters. Such adapters may be PC cards or USB adapters in a notebook PC; or ISA or PCI cards in desktop computers; or fully integrated, handheld computers such as PDAs.

About the Author
Leon A. Enriquez is managing editor and business manager of Editorial Thoughtscapes – a professional writing firm. Leon can be reached at leonenriquez@et-writer.com.

<ENDS>