WLANs

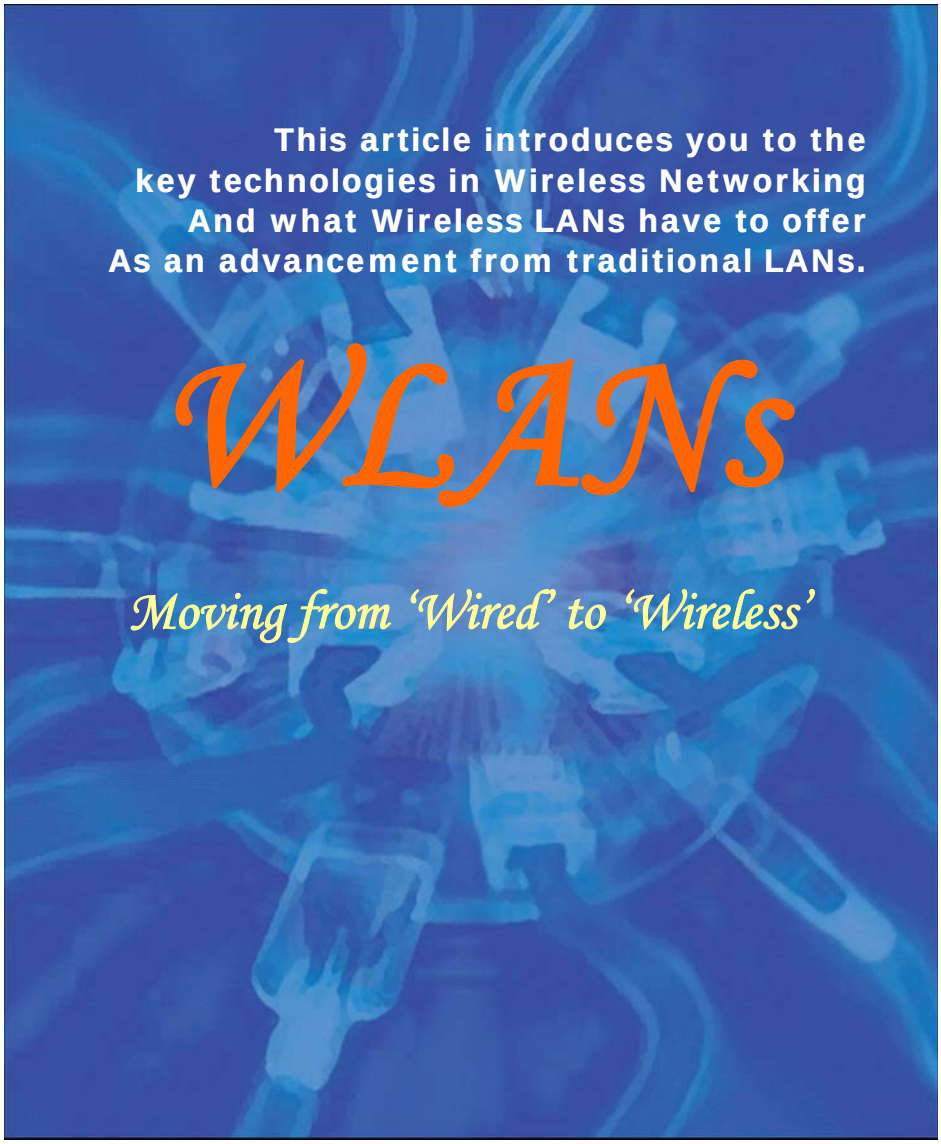
Going Wireless

Wireless Local Area Networks (WLANs), are not far more differentiated from the traditional LANs that are commonly used to connect computers and other communicating devices within a small area. WLANs have the same characteristics as their wired counterpart viz. high-speed communication restricted to a small geographical area such as an office, a campus or a building. It allows you to roam around while you are still connected to the network, minimizing the need to be wired up. To transmit your data in air, WLANs use electromagnetic waves. Thus, WLANs, (or the movable LANs) are the next step from orthodox LANs, as they supercharge the user with mobility along with data connectivity through a simplified configuration able LAN.

Within a few years, WLANs have gained popularity and wide scale – acceptance in fields such as health care, manufacturing, warehousing and academic arenas. These have been benefited from the productive gains for using handheld terminals and notepcs to realtime information to centralized hosts for processing. WLANS have widely been recognized and a general-purpose connectivity alternative for a broad range of business customers.

Why do I switch to WLANs?

Nothing in accepted as for granted in the world, acceptance is the result of reasons.



WLANs have an upper hand over conventional LANs, first of all they offer the 'quality of moving freely' or mobility to user. Everyone today, wishes to become mobile, and yet connected to the network, irrespective of your relative place you want simultaneous access to the network. But with cables or wired LANs your intention to move is impractical. A practical approach is the wireless LAN, which has all sorts of advantages such as, ease of installation which does not require wiring from every workstation in every room. This ease of installation grants WLANs inherent flexibility. For example, one can move around with his workstations, without additional wiring, or reconfiguration of the network. So wireless LAN system permits you to access real-time information from anywhere in the organization.

Secondly, what goes in favor of wireless LAN system is that its *easy and fast installable*. Also, this technology also earmarks you to take network to places where wires cannot go.

Now issues pertaining to the range, a reasonably finite amount of distance must be maintained between the two communicating devices which may be a client computer and the access point. However, the actual distances may vary, which depends on the environments (for indoor and outdoor). If the network is at the limits of the range, the performance may deteriorate.

The typical indoor ranges are 45-215 meters (150-700 feet). It is important to note that a radio transmission hinders WLANs performance. Ranges can be widen but performance degrades with distance. Outdoor ranges go upto 305 meters (1000 feet).

How to increase ranges?

Security issues.

Technology options available

The most common technologies for wireless LAN are Bluetooth, infrared, HiperLAN 2, Wi-Fi.

INFRARED (IR)

The the most important thing to know about Infrared Systems is that these systems are simple in design and therefore are inexpensive. These IR systems have high operating signal frequencies, and are somewhat sameas in fibre optic links. These systems detect only the amplitude of the signal, and because of characteristic the interference to the signal is greatly reduced.

The IR systems are capable of achieving high transmission speeds greater than other systems because these systems donot have bandwidth limit.

The most attractive feature of Infrared or employing infrared systems is that these operates in light spectrum and therefore does not require a licence from the FCC to operate

Using IR in a LAN system :-
Infrared can be used in a LAN system in two ways :-

1. Infrared signal transmission can be aimed which means that it gives a good range of a large distance (which may be in Kilometres) and therefore can be used outdoors. Using IR in such a system delivers highest bandwidth and throughput.

2. **The second way is to transmit in an omni-directional way, which involves bouncing the signal off to everything in every direction. But this has a major drawback that the signal coverage reduces to 9-18 metres (30-60 feet)**

TRANSMISSION IN IR :-

An infraLAN is the best known example of employing infrared technology in wirelessLANs. In general, infrared transmission can be classified into three types :-

1. **DIFFUSED,**
2. **DIRECTED, and**
3. **DIRECTED POINT-TO-POINT.**

1. **DIFFUSED :**
   In this type the infrared light transmitted by the sender satiates a given area, say a room, therefore the received unit located anywhere in that area can pickup the signal transmitted.

2. **DIRECTED :**
   In this before transmitting the signal the infrared light is first concentrated on a receiver. Doing this increase the transmission speed, and thereby increasing the transmital rate.

3. **DIRECTED POINT-TO-POINT**
   This transmission renders the highest transmission speed, here the communicating bodies (the transmitter and the receiver) must be aligned to each other. The infrared light is then transmitted directly to the receiver. In such a infrared transmission, the light source used depends on the environment. A light emitting diode(LED) is used in indoor, while lasers applied in outdoors.

Range :- Generally, inexpensive directed system provide very limited range (about 1 metre) and are typically used for PANs, but are very seldom used in specific WLAN applications.

LIMITATIONS :- IR radiation can affect your eyes and skin, but a proper system design can reduce these ill-effects drastically.

BLUETOOTH WIRELESS TECHNOLOGY

Bluetooth is a short ranged, radio frequency designed for point to point and point to multi-pint voice and data transfer.

This short-range radio frequency allows you to connect a wide range of computing and telecommunication devices without any cables.

The technology allows portable computers, notebooks, mobile phones, personal digital assistant and other handy gadgets to make use of "short range, low power" radio technology to connect to each other.

The tecnology of Bluetooth centers around a 9mm x 9mm microchip, which functions as a low cost and short range radio link. A bluetooth device consists of a radio unit, a link control unit, and a support unit, where the link management takes place. The interface of a Bluetooth deveice consists of the Radio and Baseband layer, and the Link Manager Protocol (LMP). The Radio is responsible for transmitting data via radio waves over the air. The Baseband, which has soft and hardware, controls the radio and is responsible for lower lever encryption. The Link Manager Protocol is in charge of lInk setup, authentication, and Link Configuration. The radio transceiver operates on the 2.4 GHz IM band which is defined as 2400-2483 MHz. These radio use a spread spectrum, frequency hopping, and full-duplex signal at up to 1600 hops per sec. The signal hops amount 79 frequencies at 1 MHz intervals to give a high degree of interference immunity. Upto seven simultaneous connections can be established and maintained.

There are four major components in any Bluetooth wireless technology system :-
A software stack,
A baseband unit,
A software stack and,
An application software.

The radio unit is the actual radio transceivers, which forces the wireless link between the communicating bluetooth devices. The baseband unit is hardware, consisting of a flash memory and a CPU, which interfaces with the radio unit and the host device electronics at the hardware level. The baseband hardware provides all required fucntionality to establish and maintain a Bluetooth wireless connection between deveices. The software stack is the driver sotware or firmware that enable the application level software to interface with the baseband unit. The application software implements the user interface and overall functionality of the bluetooth device.

HiperLAN2

The HiperLAN2 was developed by the European Telecommunications Standards Institute(ETSI) as part of the Broadband Radio Access Networks (BRAN) standardisation project. HiperLAN2 or High Performance Radio Local Area Network type 2, is a standard for Wireless Local Area Network (WLAN).

Purpose Of Hiperlan :- to standardise the next generation WLAN technologies to meet future networking requirements.
The requirements include support for increase bandwidth, Quality of Service, Security and handover between different networking environments.
HiperLAN2 is best suited to connect mobiles, portables and laptops to a fixed access point, this new high performance 5 GHz radio networking technology is designed specifically suited for operating in LAN environment allowing interconnection into any type of fixed network technology.

Other features of HiperLAN2 technology is that it supports unicast, multicast and broadcast transmisions and assures flexible mobility in addition to high transmission speed of 54 mbps over the air at the physical layer. In augment to above, it offers sustained throughput for applications at 20mbps.

In addition to offering high transmission speed, the network will provide mobile terminals with security and mobility management services when moving. To achieve it goals, HiperLAN2 relies on cellular networking topology combined with an ad hoc networking

HiperLAN2 support 2 modes of operation :

1. **Centralised Mode :- this mode is used in cellular networking topology where each radio cell is controlled by an access point covering a certain geographical area. In this mode, a mobile terminal communicates with other mobile terminals or with the core network via an access point. The mode is suitable for business applications, operating in both indoor and outdoors.**

2. **Direct Mode :- In this mode, ther is an ad hoc networking topology, as found in typical home environments, here a radio cell covers the whole serving area. In this mobile terminals in a single-cell home 'network' can directly exahange data.**

WI-FI (Wireless Fidelity)

Wi-Fi is an acronym for Wireless-Fidelity and is another name for IEEE 802.11b. It is promoted by the Wireless Ethernet Compatibility Alliance (WECA). Wi-Fi operates on the 2.4 GHz frequency, which is unlicensed band shared by microwave ovens and cordless telephones. Wi-Fi is the dominant standard protocol for wireless local area networking, it uses an airwave frequency, and as a result regulators have been fored t run it slowly to prevent interference. Tenologial improvements have made it possible to speed Wi-Fi transmission Five-fold, a big boon to networking companies

HomeRF

This is developed by the Home Radio Frequency Working Group(WG), Home RF, initially included 5 leading computer companies, but sooner 50 other companies made up of leaders across the PC, consumer electronics, networking, software, semiconductor industries, joined.

The Home RF stander include support for advanced networking features like sucurity, interference dodging, and quality of serveice – all transparent to the end user. HomeRFis not just a networking standard, it's the wireless neworkign solution for broadband homes – the system that allows families and small/home offices to experience the freedom of fast, simultaneous, and wireless internet access. Using only on internet connection, whether dial-up, DSL or cable, every member of the family can wirelessly access the internet and PC resources simultaneously, each using a different laptop, PC or Web-based device, to enjoy online access whereever and whenever around the home

HomeRF favoured devices operate in the license-free 2.4GHz frequency band and utilize frequency-hopping spread spectrum RF technology for secure wireless communications.