Experiment No 7

Title: Study of WLAN

Objective: To study WLAN: Ad-hoc and Infrastructure Mode

Expected Outcome of Experiment:

CO	Outcome
1	Ability to explain the structure and components of GSM, GPRS, Mobile IP, WLAN, 3G and 4G.

Prerequisite : Networking

Books/ Journals/ Websites referred:

Theory/Abstract:

1. **Types of WLAN**

A wireless local area network (or LAN) is a data connection which uses radio waves rather than physical Ethernet cables to connect a network together. It enables any devices connected to the LAN to freely roam within the area of the wireless broadcast, making it ideal for use with laptops or mobile devices. There are a few types of wireless LAN configurations available.

• **Private Wireless LANs**

This is the most common area to see a wireless LAN. Home WLANs are meant to be used for small areas, usually with up to a 200-foot radius, and as such are suitable for homes or small businesses. The private WLAN subscribes to the 802.11 technology standard for wireless networking, with the most common being the 802.11b standard, often referred to as Wi-Fi.

Private WLANS will frequently be based around a single router/access point which will connect to the Internet and then allow computer terminals to share the network. Any device compatible with 802.11 will be able to connect to a private WLAN.

• **Wide Area WLAN**

These types of WLAN work in the same way as a private WLAN, however they offer a much further reach in terms of access to the network: up to a 10-mile radius. The technology still uses an 802.11 connection, but to transmit a wider radius more powerful antennas and transceivers are used. This type of WLAN is useful for connecting a network over a long distance, over a large industrial estate for example, where a wired network would be costly and unfeasible.

• **Business WLAN**

A business network is an expansion of the private WLAN in terms of technology, except that this network will use multiple access points rather than one. All of the access points will connect to a central "hub" which splits the connection into multiple streams, creating a

signal which can cover many different areas. The user will only connect to one network but will have access to all of the connected access points.

• **Enterprise WLAN**

This WLAN is an expansion on the business WLAN. It covers a much larger area and is found within governmental, academic or large corporate organizations that need to share a network over multiple locations. The network is controlled by a central computer, and the access points all connect wirelessly to this computer. Changes can be made to each access point from this central computer, and this setup makes it easy for the network to be changed from one central location rather than multiple locations.

• **Ad-hoc Networks**

This network can be set up by a number mobile users meeting in a small room. It does not need any support from a wired/wireless backbone. There are two ways to implement this network.

1. **Broadcasting/Flooding** Suppose that a mobile user A wants to send data to another user B in the same area. When the packets containing the data are ready, user A broadcasts the packets. On receiving the packets, the receiver checks the identification on the packet. If that receiver was not the correct destination, then it rebroadcasts the packets. This process is repeated until user B gets the data.

2. **Temporary Infrastructure**
   In this method, the mobile users set up a temporary infrastructure. But this method is complicated and it introduces overheads. It is useful only when there is a small number of mobile users.

• **Infrastructure Networks**

This type of network allows users to move in a building while they are connected to resources. The IEEE Project 802.11 specified the components in a wireless LAN architecture. In an infrastructure network, a cell is also known as a Basic Service Area (BSA). It contains a number of wireless stations. The size of a BSA depends on the power of the transmitter and receiver units, it also depends on the environment. A number of BSAs are connected to each other and to a distribution system by Access Points (APs). A group of stations belonging to an AP is called a Basic Service Set (BSS).

2. **802.11 WLAN Standards**

802.11 and 802.11x refers to a family of specifications developed by the IEEE for wireless LAN (WLAN) technology. 802.11 specifies an over-the-air interface between a wireless client and a base station or between two wireless clients.

The IEEE accepted the specification in 1997. There are several specifications in the 802.11 family:

• **802.11** — applies to wireless LANs and provides 1 or 2 Mbps transmission in the 2.4 GHz band using either frequency hopping spread spectrum (FHSS) or direct sequence spread spectrum (DSSS).

• **802.11a** — an extension to 802.11 that applies to wireless LANs and provides up to 54-Mbps in the 5GHz band. 802.11a uses an orthogonal frequency division multiplexing encoding scheme rather than FHSS or DSSS.

• **802.11b** (also referred to as 802.11 High Rate or Wi-Fi) — an extension to 802.11 that applies to wireless LANS and provides 11 Mbps transmission (with a fallback to 5.5, 2 and 1-Mbps) in the 2.4 GHz band. 802.11b uses only DSSS. 802.11b was a 1999 ratification to the original 802.11 standard, allowing wireless functionality comparable to Ethernet.

• **802.11e** — a wireless draft standard that defines the Quality of Service (QoS) support for LANs, and is an enhancement to the 802.11a and 802.11b wireless LAN (WLAN)

Conclusion : Thuswe have studied WLAN