

3.3 Latest Technology in Wireless Network

Bluetooth

Bluetooth

- Bluetooth is a **high-speed, low-power microwave** wireless link technology, designed to connect **phones, laptops, PDAs** and other portable equipment together with little or no work by the user.

What is BLUETOOTH:

- Bluetooth is a wireless technology used to **transfer data** between different electronic devices.
- The distance of data transmission is small.
- This technology **removes the use of cords, cables, adapters.**



History Of Bluetooth:

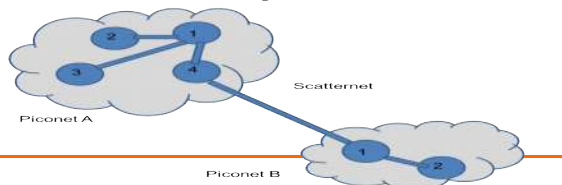
- Bluetooth was invented in 1994 by **Ericsson**.
- Bluetooth is not owned by any one company and is developed and maintained by SIG.
- The name Bluetooth came from a code name originally used by SIG for the project and is a reference to a 10th century Danish king named **Harold Bluetooth**, who was responsible for uniting Norway, Sweden, and Denmark.

Bluetooth

- Operates at 2.4 GHz
- The effective range: 32m(10feet)
- Point to point connecting device
- Average data transfer **rate:1Mbps**
- known as the IEEE 802.15 standards

Bluetooth Architecture

- **Piconet**
 - Bluetooth network is called Piconet or small network.
 - A Piconet consist of maximum Eight Stations.
 - One of the device is called Master. Others called slaves.
 - Communication is one-to-one or one to many.
- **Scatternet**
 - Collection of two or more piconet.



Types Of Bluetooth Devices:

1. Head Set
2. In-Car Bluetooth System
3. Bluetooth Equipped Printer
4. Bluetooth Equipped Web Cam
5. Bluetooth GPS System
6. Bluetooth Key Board

Importance Of Bluetooth:

- These have **Replaced cables** for transferring Information from one Electronic Device to another.
- These have decreased Strain like carrying phones while talking, **making hands free** to do another work.
- This is **cheaply Available**.
- It's Mobility is also very Important as it doesn't need any **power** outlet or Internet connection or any other items.

Disadvantages Of Bluetooth:

- Data sent between two Bluetooth devices is **very slow compared** with Wi-Fi transfer Rate.
- **Range Of a Bluetooth Device is 15-30 feet** depending upon the Device.
- **Security** is Biggest Disadvantage as transfer takes place through radio waves and a hacker can easily hack it.
- **Battery usage** is also a problem, it will make device out of power before it would have if Bluetooth was not powered on.



WIFI-Wireless fidelity (Wireless LAN)

- Wi-Fi allows networking of computers and digital devices **without the need for wires**.
- Data is transferred over radio frequencies, allowing Wi-Fi capable devices to receive and transmit data.
- The widespread use of the technology and its availability in both **residential homes** and **public places** including
 - **parks, gathering spots, and coffee shops** – have made it one of the **most popular** data transmission technologies available today.

Wi-Fi

- Wi-Fi uses a **radio technology** known as 802.11, which can transmit data over short distances using high frequencies.
- 802.11 operates on either **2.4GHz or 5GHz** depending on its type.
- The network's central point is the **access point**, which is a router with transmitting antennas which route the transfer of data.
- Typically, the range of this Wi-Fi access point to any Wi-Fi capable devices is about **300 feet outdoors** and **150 feet indoors**.

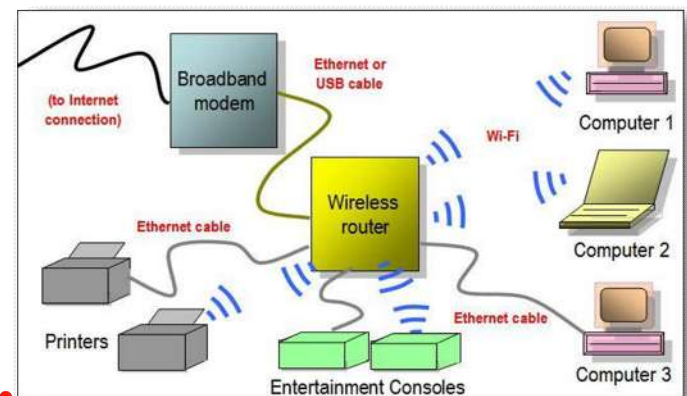
Types

- Currently there are four major types of Wi-Fi, known as
 - **802.11a, 802.11b, 802.11g, and 802.11n.**
- The two **most common and oldest** types are **802.11b** and **g**, which operate at a frequency of **2.4GHz**.
- **802.11b** has a maximum speed of about **11Mbps**, while **802.11g** can transmit data at speeds up to **54Mbps**.
- **802.11a** was the next version of Wi-Fi, and it operated on a frequency of **5GHz** and data transmission at speeds of **54Mbps**.
- **802.11n** is the newest version of the technology.
- It operates at speeds up to **450Mbps** on either 2.4GHz or 5GHz.

Elements of a WI-FI Network

- **Access Point (AP)** - The AP is a wireless LAN transceiver or “base station” that can connect one or many wireless devices simultaneously to the Internet.
- **Wi-Fi cards** - They accept the wireless signal and relay information. They can be internal and external.(e.g PCMCIA Card for Laptop and PCI Card for Desktop PC)
- **Safeguards** - Firewalls and anti-virus software protect networks from uninvited users and keep information secure.

How a Wi-Fi Network Works



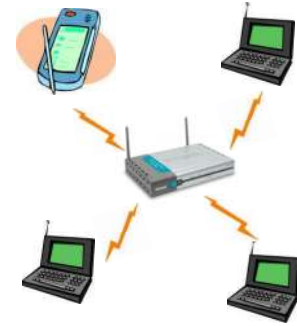
Peer-to-peer topology (Ad-hoc Mode)

- ❖ AP is not required.
- ❖ Client devices within a cell can communicate with each other directly.
- ❖ It is useful for setting up a wireless network quickly and easily.



AP-based topology (Infrastructure Mode)

- ❖ The client communicate through Access Point.
- ❖ Any communication has to go through AP.
- ❖ If a Mobile Station (MS), like a computer, a PDA, or a phone, wants to communicate with another MS, it needs to send the information to AP first, then AP sends it to the destination MS.



Advantages

- Mobility
- Ease of Installation
- Flexibility
- Cost
- Reliability
- Security
- Use unlicensed part of the radio spectrum
- Roaming
- Speed

Limitations

- Interference
- Degradation in performance
- High power consumption
- Limited range



WiMax

- WIMAX stands for **Worldwide Interoperability for Microwave Access**.
- WiMAX refers to broadband wireless networks that are based on the IEEE 802.16 standard.
- WiMAX, have a range of up to 31 miles, is primarily aimed at making broadband network access widely available without the expense of wires.

WiMax

- Based on **Wireless MAN** technology.
- A wireless technology optimized for the delivery of IP centric services over a wide area.
- A scalable wireless platform for constructing alternative and complementary broadband networks.
- The IEEE 802.16 address two types of usage models –
 - A fixed usage model (IEEE 802.16-2004).
 - A portable usage model (IEEE 802.16e)

WiMax How it Works?

- A WiMAX system consists of two parts:
- A **WiMAX tower**, similar in concept to a cell-phone tower - A single WiMAX tower can provide coverage to a very large area -- as big as 3,000 square miles (~8,000 square km).
- A **WiMAX receiver** - The receiver and antenna could be a small box or PCMCIA card, or they could be built into a laptop the way WiFi access is today.
- A WiMAX tower station can connect directly to the Internet using a high-bandwidth, wired connection.

