Introduction to Wireless Networks

- Computer networks that are not connected by cables are called wireless networks. They generally use radio waves for communication between the network nodes. They allow devices to be connected to the network while roaming around within the network coverage.

Types of Wireless Networks

- Wireless LANs − Connects two or more network devices using wireless distribution techniques.
- Wireless MANs − Connects two or more wireless LANs spreading over a metropolitan area.
- Wireless WANs − Connects large areas comprising LANs, MANs and personal networks.

Advantages of Wireless Networks

- It provides clutter-free desks due to the absence of wires and cables.
- It increases the mobility of network devices connected to the system since the devices need not be connected to each other.
- Accessing network devices from any location within the network coverage or Wi-Fi hotspot becomes convenient since laying out cables is not needed.
- Installation and setup of wireless networks are easier.
- New devices can be easily connected to the existing setup since they needn’t be wired to the present equipment. Also, the number of equipment that can be added or removed to the system can vary considerably since they are not limited by the cable capacity. This makes wireless networks very scalable.
- Wireless networks require very limited or no wires. Thus, it reduces the equipment and setup costs.

Examples of wireless networks

- Mobile phone networks
- Wireless sensor networks
- Satellite communication networks
- Terrestrial microwave networks

Wireless Local Area Network

- A Wireless Local Area Network (Wireless LAN) can be used to replace a wired LAN inside a building.
- Typical usages such networks are to allow people to use the local network services or connect to the Inter etc.,without using wires.

- Usually, the highest data rates these networks provide are the range of 54 Mbps.

- Some other popular places where such networks arecreated are de hot spots created by Internet/networkservice providers at train stations, airports, cafeteria etc.

Wireless Local Area Network

- Wireless LAN is one of the fastest-growing technologies. IEEE 802.11 refers to the set of standards that define communication for wireless LANs (wireless local area networks, or WLANs). The technology behind 802.11 is branded to consumers as Wi-Fi.

- Wireless LAN can be found on college campuses, in office buildings, in hospitals, stock exchanges and in many public areas. It has become popular due to the ease of installation and location freedom with the gaining popularity of laptops.

Wireless Local Area Network - Advantages

- Fast Installation and Simplicity:Installing a wireless LAN system can be fast and easy and can eliminate the need to pull cables through walls, floor, and ceilings.
- Increased productivity for the mobile employee:The mobile user whose primary computer is a portable computer can change location and always remain connected to the network. This enables the mobile user to travel to various places, let it be meeting rooms, hallways, lobbies, cafeterias, classrooms, and so forth.
- Reduced Cost: The initial investment required for wireless LAN hardware is higher than the cost of wired LAN hardware. However, the overall installation expenses and life cycle costs are significantly lower. Long-term cost benefits are greatest in dynamic environments, requiring frequent moves and changes.
- Mobility and collaboration: It can stay connected while moving throughout your worksite. Access up-to-the-minute communications and all documents and apps on the network, anywhere, anytime.

Wireless Local Area Network- Advantages

- Accessibility: It can provide network access across your organization, even in areas that have been challenging to reach with the wired network, so your entire team can stay in touch.
- Expandability:It is used to grow your network efficiently, adding new users and locations without needing to run cables and wires.
- Guest access:It can offer secure network access to guest users, including customers and business partners while keeping your network resources protected.

Wireless Local Area Network- Disadvantages

- Wireless LANs use radio waves to communicate. Special care needs to be taken to encrypt information.
- The signal is noisier than on wires, and more bandwidth needs to be spent on error correction.
- A typical IEEE 802.11 access point has A range of meters from where devices can connect. To extend the range more access points are needed.
- There are many reliability problems, especially those connected to interference from other devices.
- Wireless LANs are much slower than wired ones; this may not matter for most users though,because the bottleneck in a home network is usually the speed of the ADSL line or other Internet connection.

Mobile Computing

- Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link.
- Mobile Computing is ability to compute remotely while on the move, it possible for people to access information from anywhere and at anytime.
- Mobility provides the capabilities to change location while communicating to invoke computing services at some remote computers .
- Mobile devices can be connected to a Local Area Network (LAN) or can take advantage of WiFi or wireless technology by connecting via a Wireless Local Area Network (WLAN).

Mobile Computing

Benefits of Mobile Computing:

- **Connectivity:** You can stay connected to all sources at all times.
- **Social Engagement**: You can interact with a variety of users via the internet.
- **Personalization:** You can tailor your mobile computing to your individual needs.

Mobile Computing v/s Wireless Networking

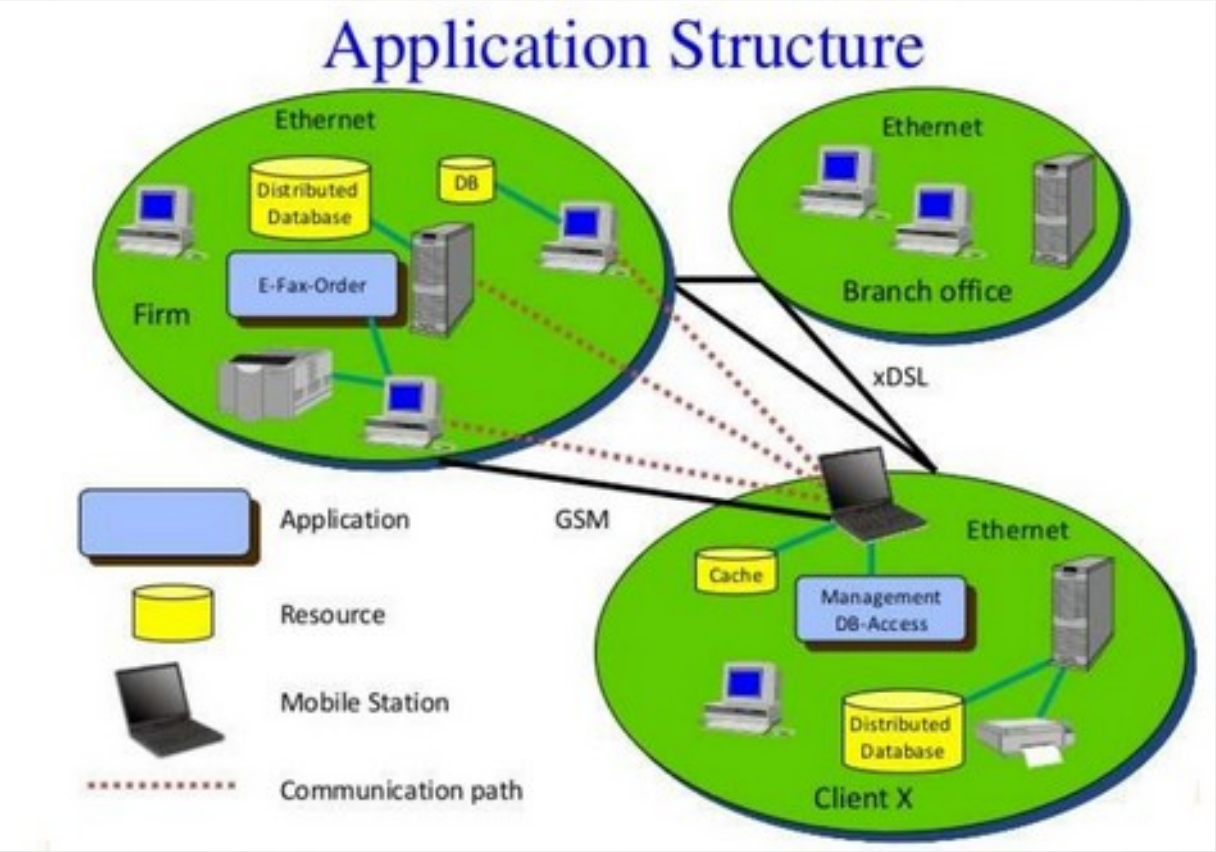
Mobile Computing	Wireless Networking
Mobile Computing refers to computing devices that **are not restricted to a desktop**.	Wireless networking refers to the method of **transferring information between a computing devices and a data source without a physical connection**
It refers to computing device that is **not connected to a central network**	It is simply data communication **without the use of landline**
Include laptop, smart phones, PDA	Involve cellular telephone, a two way radio, fixed wireless connection, a laser or satellite communication.
Communicate with base location, with or without a wireless connection	Computing device is continuously connected to the base network.
Uses mobile networks (airtel, idea,jio)	Routers
Uses GPRS, HSPA, EDGE, LTE	Wireless switches, Wireless HUBs
Can use wireless network also	This cannot use Mobile Networks directly(only through network sharing)

Wired Networks v/s Mobile Networks

Wired Networks	Mobile Networks
Speed of operation : Higher	Speed of operation : lower compare to wired networks
System Bandwidth : High	System Bandwidth : Low, as Frequency Spectrum is very scarse resource
Cost : Less as cables are not expensive	Cost : More as wireless subscriber stations, wireless routers, wireless access points and adapters are expensive
Installation : Wired network installation is cumbersome and it requires more time	Installation : Wireless network installation is easy and it requires less time
Transmission medium : copper wires, optical fiber cables, ethernet	Transmission medium : EM waves or radiowaves or infrared
Applications : LAN (Ethernet), MAN	Applications : WLAN, WPAN(Zigbee, bluetooth), Infrared, Cellular(GSM,CDMA, LTE)
Quality of Service : Better	Quality of Service : Poor due to high value of jitter and delay in connection setup

Mobile Computing

Structure of Mobile Computing:



Applications for mobile computing

- There are several applications for mobile computing including wireless remote access by travelers and commuters, point of sale, stock trading, medical emergency care, law enforcement, package delivery, education, insurance industry, disaster recovery and management, trucking industry, intelligence and military.
- Most of these applications can be classified into:
  - wireless and mobile access to the Internet
  - wireless and mobile access to private Intranets
  - wireless and adhocly mobile access between mobile computers.

Mobile Computing

Characteristics of Mobile Computing:

Portability :-

The Ability to move a device within a learning environment or to different environments with ease.

Social Interactivity :-

The ability to share data and collaboration between users.

Context Sensitivity :-

The ability to gather and respond to real or simulated data unique to a current location , environment or time.

Mobile Computing

Characteristics of Mobile Computing:

Connectivity :-

The ability to be digitally connected for the purpose of communication of data in any environment.

Individual :-

The ability to use the technology to provide scaffolding on difficult activities and lesson customization
for individual learners.

Wireless Communication :-

Mobile devices are typically capable of communication with other similar devices , with stationary computers and portable phones. Base mobile devices are capable of accessing the Internet through Bluetooth or Wi- Fi networks, and many models are equipped to access data networks as well.