Internet wireless/Mobile Communication

- GSM –
- GSM (Global System for Mobile Communications, originally Groupe
- Spécial Mobile) is a standard set developed by the European
- Telecommunications Standards Institute (ETSI) to describe
- technologies for second generation (2G) digital cellular networks.
- It uses TDMA & FDMA techniques as access mechanism.
- In this , we divide bandwidth in to time slot for better utilization of bandwidth.

Division by frequency, so that each pair of communicators is allocated part of the spectrum for all of the time, results in Frequency Division Multiple Access (FDMA).
Division by time, so that each pair of communicators is allocated all (or at least a large part) of the spectrum for part of the time results in Time Division Multiple Access (TDMA).

- CDMA (Code-Division Multiple Access) –

- CDMA is a digital cellular technology that uses spread-spectrum techniques.
- In CDMA every communicator is allocated the entire spectrum all of the time.
- CDMA uses codes to identify connections.
- For radio systems there are two resources, frequency and time.
- In Code Division Multiple Access (CDMA),every communicator will be allocated the entire spectrum all of the time.
- CDMA uses codes to identify connections.

Difference between GSM and CDMA

GSM	CDMA
It is much easier to swap phones on GSM networks because GSM carriers put customer information on a removable SIM card.	CDMA carriers use network-based white lists to verify their subscribers. We can only use CDMA sim card not GSM one.
GSM handsets came with a SIM card slot	CDMA did not come with SIM Card slot , it means CDMA is a handset-based standard, with a phone number linked to a particular device.
Voice and data transmission at the same time	Can not do voice and data transmission simultaneously.
It’s roaming is worldwide	It’s roaming is limited
Data rate is slower	Data rate is slower
Network tower in cell serves the mobile phone of that data	There is a physical channel and a dedicated code for each device in the network.
Full form- global system for mobile	Full form – code division multiple access
It is SIM specific	It is handset specific

- **GPRS (General packet radio service) –**

- GPRS is a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications (GSM).

- The GPRS system is an integrated part of the GSM network switching subsystem.

- GPRS usage is typically charged based on volume of data.

- This contrasts with circuit switching data, which is typically billed per minute of connection time, regardless of whether or not the user transfers data during that period.

GPS stands for **Global Positioning System** whereas **GPRS** stands for General Packet Radio Service.
GPRS is used for video calling, Email accessing, multimedia messaging etc whereas **GPS** is satellite based navigation system.

- WLL –

- WLL (Wireless in Local Loop) is a network technology based on CDMA (Code Division Multiple Access) principle.

- This technology is useful for providing cost effective mobile services and wireless telephone connection in areas where provision of landline telephone connection is not feasible or where demand for mobile phones is very high.

Network devices

Wi-Fi cards - are small and portable cards that allow your computer to connect to the internet through a wireless network.

Wi- Fi transmission is through the radio waves, these signals are picked up by Wi-Fi receivers such as computers and cell phones equipped with Wi-Fi cards.

The devices need to be within the range of a Wi-Fi network to receive the signals and produces a wireless internet connection.

Once a connection is established between user and the network, the user is prompted with a login screen and password for establishing is a secure connection.

Wi-Fi cards can be external or internal.

If a Wi-Fi card is not installed inside your computer, you may purchase an external USB antenna attachment and connect it to your device.

Many computers and mobile devices are now adays equipped with wireless networking capability and do not require a Wi-Fi card.

- Wi-Fi –

- Wireless-Fidelity is a popular technology that allows an electronic device to exchange data wirelessly (using radio waves) over a computer network, including high-speed Internet connections.

- It uses radio waves to provide wireless high-speed Internet access.

- **Wi-Fi** is a **wireless network** technology that sends the data via **internet** connections (the highway) through the air to wide area networks and on to non-wired computers.

- The Wi-Fi Alliance defines Wi-Fi as any wireless local area network(WLAN) products that are based on the Institute of Electrical and Electronics Engineers (IEEE) 802.11 standards.

A **WiFi** connection transmits data via **wireless** signals, while an Ethernet connection transmits **data over cable**.
An Ethernet connection is generally faster than a **WiFi** connection and provides greater reliability and security.

Wi-Fi

- Wi-Fi is a wireless networking technology that allows devices such as computers (laptops and desktops), mobile devices (smart phones and wearables), and other equipment (printers and video cameras) to interface with the Internet. It allows these devices--and many more--to exchange information with one another, creating a network.

- Internet connectivity occurs through a wireless router. When you access Wi-Fi, you are connecting to a wireless router that allows your Wi-Fi-compatible devices to interface with the Internet.

WiMAX (Worldwide Interoperability for Microwave Access) –

- WiMAX is a wireless communications standard designed to provide 30 to 40 megabit-per-second data rates, with the 2011 update providing up to 1 Gbit/s for fixed stations.
- It is a part of “fourth generation,” or 4G, of wireless-communication technology.
- WiMax far surpasses the 30-metre wireless range of a conventional Wi-Fi local area network (LAN), offering a metropolitan area network with a signal radius of about 50 km.

• WiMAX

- WiMAX is a wireless communications standard designed for creating metropolitan area networks (MANs).
- It is similar to the Wi-Fi standard, but supports a far greater range of coverage.
- While a Wi-Fi signal can cover a radius of several hundred feet, a fixed WiMAX station can cover a range of up to 30 miles.
- Mobile WiMAX stations can broadcast up to 10 miles.
- While Wi-Fi is a good wireless Internet solution for home networks and coffee shops, it is impractical for larger areas.
- In order to cover a large area, multiple Wi-Fi repeaters must be set up at consistent intervals.
- For areas that span several miles, this is a rather inefficient method to provide wireless access and typically requires lots of maintenance.

Wireless Networks – It uses high-frequency radio waves rather than wires to communicate. Wireless allows for devices to be shared without networking cable which increases mobility but decreases range.

Transmission media

Infrared Wave Transmission –

1. Short Range Communication:

2. Infrared waves can travel from a few centimetres to several meters.(Approx. 5m).
3. Line of Sight Propagation:Infrared uses point to point communication, both transmitter and receiver should be placed in line of sight of each other and there should not be any obstacle in between.

4. Cannot Penetrate Solid object.

5. It is Inexpensive mode of Communication. Secure :

6. At a time only two devices can communicate therefore information passed to one device is not leaked to another device.

Transmission media

Bluetooth–

1. Bluetooth technology uses radio waves in the frequency range of 2.402 GHz to 2.480 GHz.
2. This technology is used for short range communication (approx. 10m) in a variety of devices for wireless communication.

Characteristics of Bluetooth Transmission:

1. Line of sight between communicating devices is not required.
2. Bluetooth can connect upto eight devices simultaneously.
3. Slow data transfer rate (upto 1Mbps).

Transmission media

Radio Wave Transmission:-

1. Long Range Communication :
2. Radio waves can cover distances ranging from a few meters (in walkie-talkies) up to covering an entire city.
3. Omnidirectional:
4. Radio waves are propagated in all directions. Therefore sending and receiving antennas do not have to be aligned.
5. Penetrates Solid Objects.
6. Inexpensive mode of communication.
7. Radio wave communication is insecure communication.

Transmission media

Microwave radio,

1. It is a form of radio transmission that use.
2. Ultra-high frequencies.
3. It is a point- to-point, rather than a broadcast, transmission system.
4. Additionally, each antenna must be within line of sight of the next antenna.
5. Frequency Bands Maximum Antenna Separation Analog/Digital 4-6 GHz 32-48 km Analog 10-12 GHz 16-24 km Digital 18-23 GHz 8-11 km Digital.

Transmission media

Satellite Communication

1. It provide worldwide coverage independent to population density.

2. Satellite ommunication Systems offer telecommunication (Satellite Phones), positioning and navigation (GPS), broadcasting, internet, Mobile, TV, etc.

3. It support Very Long Range Communication with Line of Sight Propagation .

4. It Cannot Penetrate Solid Objects.

5. It is Very Expensive communication mode.