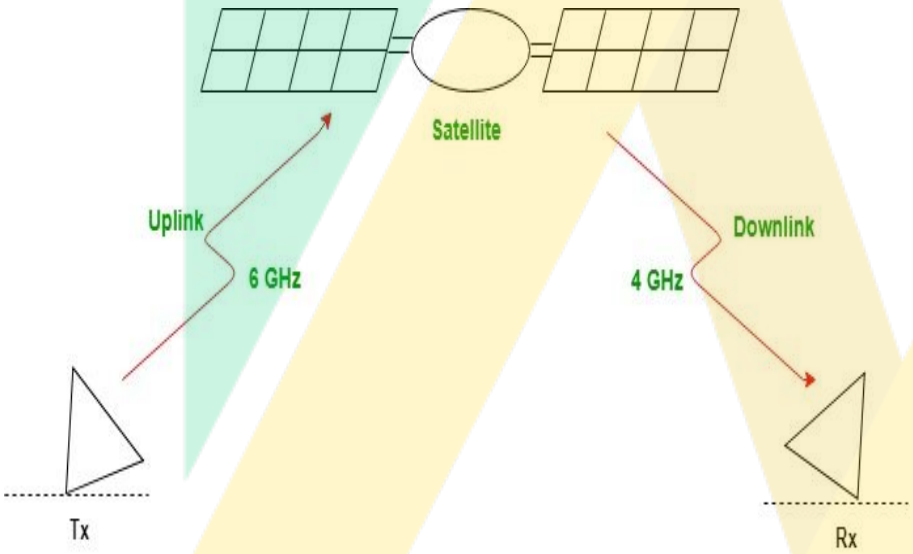
# Module 4 and 5

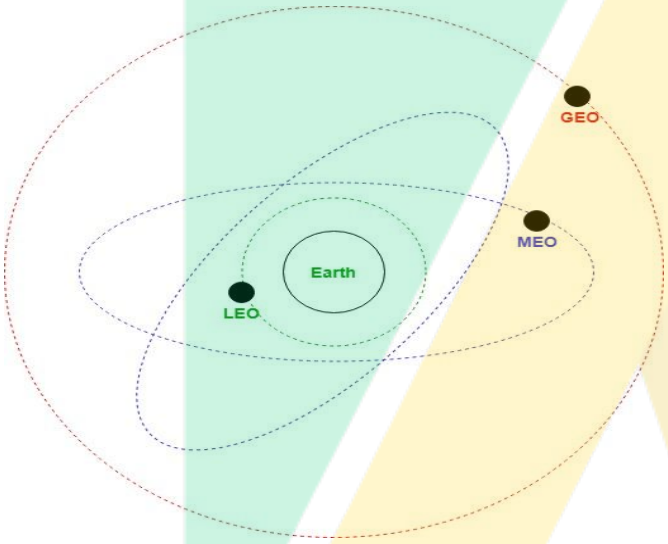
## Global Mobile Satellite System

GMSS stands for **Global Mobile Satellite System**. An artificial body which is placed in an orbit around the earth for the purpose of communication is known as **Communication satellite**. GMSS is a system which consists of various artificial communication satellites orbiting around the earth for the purpose of communication.




Uplink and downlink frequencies must be different to avoid interference. Now, stations at the earth have greater power sources than that of satellite as it has only solar power. Also, higher frequency results in higher attenuation and to compensate with it more power is required. So, uplink uses higher frequency to penetrate the environment.

**Satellite Orbits:**




1. **LEO:**

   LEO stands for Low Earth Orbit. The communication satellites in this orbit operates at a distance of about 500 to 1200 km above the earth's surface and their orbital time period generally ranges between 95 to 120 minutes. Low Orbit Satellites makes global radio coverage possible.

2. **MEO:**

   MEO stands for Medium Earth Orbit. The communication satellites in this orbit operates at a distance of about 5000 to 12000 km above the earth's surface and their orbital time period is about 6 hours. Medium Orbit Satellites are used for land and sea navigation, for example Google Maps.

3. **GEO:**

   GEO stands for Geostationary Earth Orbit. The communication satellites in this orbit operates at a distance of about 36000 km above the earth's

surface and their orbital time period is about 24 hours. Geostationary Orbit Satellites are used for radio broadcasting

**Case Studies:**

- **IRIDIUM:**
  Iridium system is a satellite-based, wireless personal communications network providing voice and data features all over the globe. It is comprised of three principal components
- 1. the satellite network
- 2. the ground network
- 3. Iridium subscriber products, including phones and data modems.

Iridium satellite constellation contains 77 satellites. It was the first satellite constellation to offer satellite based Personal Communication Services (PCS). It provides voice and data services all over the globe. It is named after the element IRIDIUM whose atomic number is 77 and features the 77 satellites as electrons revolving around the earth as nucleus. Actually only 66 satellites are active orbiting in 6 orbital planes. Each plane is 30 degrees apart and contains 11 satellites.

- **GlobalStar:**
  Globalstar is a Low Earth Orbit(LEO) satellite constellation for satellite phone and low-speed data communications. Globalstar orbits have an orbital height of approximately 1400 km.GlobalStar satellite constellation contains 24 LEO satellites and was set up by an American satellite company, GlobalStar Inc. It is a 2nd generation satellite constellation and is

used for satellite phone and low-speed data communication. The 24 LEO satellites are orbiting in the planes which are inclined at an angle of 52 degrees and they doesn't cover pole areas. It provides voice and data services.

# Virtual Networks

Virtual networking is a technology that facilitates data communication between two or more virtual machines (VM). It is similar to traditional computer networking but provides interconnection between VMs, virtual servers and other related components in a virtualized computing environment. Virtual networking is based on physical computer networking principles, but its functions are mostly software-driven. In a virtual networking environment, each VM is assigned a software-based virtual Ethernet card with separate media access control (MAC) and IP addresses. The VMs communicate by addressing the specified IP address of each destination VM. Similarly, a virtual local area network(VLAN) is created through software-based virtual switches that provide network communication between all virtual and connected machines.Virtual networking also may be implemented on VMs that are installed or deployed on network/Internet-enabled physical servers or PCs.

## Bluetooth Technology

Bluetooth wireless technology is a short-range radio technology, which is developed for Personal Area Network (PAN). Bluetooth is a standard developed by a group of

electronics manufacturers that allows any sort of electronic equipment -- from computers and cell phones to keyboards and headphones -- to make its own connections, without wires, cables or any direct action from a user. It is an ad hoc type network operable over a small area such as a room. Bluetooth wireless technology makes it possible to transmit signals over short distances between telephones, computers and other devices and thereby simplify communication and synchronization between devices. It is a global standard that:

• Eliminates wires and cables between both stationary and mobile devices

• Facilitates both data and voice communication

•Offers the possibility of ad hoc networks and delivers the ultimate synchronicity between all your personal devices Bluetooth is a dynamic standard where devices can automatically find each other, establish connections, and discover what they can do for each other on an ad hoc basis. Bluetooth is intended to be a standard that works at two levels:

• It provides agreement at the physical level -- Bluetooth is a radio-frequency standard.
• It also provides agreement at the next level up, where products have to agree on when bits are sent, how many will be sent at a time and how the parties in a conversation can be sure that the message received is the same as the message sent.

# Bluetooth Protocols

Bluetooth is defined as a layered protocol architecture consisting of core protocols, cable replacement and telephony control protocols, and adopted protocols.

## Core System Protocols :

• **Radio (RF) protocol :** Specifies details of the air interface, the use of frequency hopping, modulation scheme, and transmit power.

• **Baseband protocol :** Concerned with connection establishment within a Piconet, addressing, packet format, timing, and power control.

• **Link Manager protocol (LMP) :** Responsible for link setup between Bluetooth devices and ongoing link management.

• **Logical link control and adaptation protocol (L2CAP) :** L2CAP provides both connectionless and connection-oriented services.

• **Service discovery protocol (SDP) :** Device information, services, and the characteristics of the services can be queried to enable the establishment of a connection between two or more Bluetooth devices

## Additional Protocols :

• **RF COMM :** It provides connections to multiple devices by relying on L2CAP to handle multiplexing over single connection

• **Wireless access protocol (WAP):** It supports the limited display size and resolution typically found on mobile devices by providing special formats for Web pages

• **Object exchange protocol (OBEX):** OBEX is a protocol designed to allow a variety of devices to exchange data simply and spontaneously.

• **Telephony control protocol :** Bluetooth Telephony Control protocol Specification (TCS) defines how telephone calls should be sent across a Bluetooth link

• **Point-to-point protocol (PPP):** The point-to-point protocol is an Internet standard protocol for transporting IP datagram over a point-to-point link