

~~2020~~ ~~What is GPS? How does it work (5)~~

1. Definition

GPS is a satellite-based navigation system that allows land, sea and airborne users to determine their location, velocity and time 24 hours a day, regardless of weather conditions and from anywhere in the world.

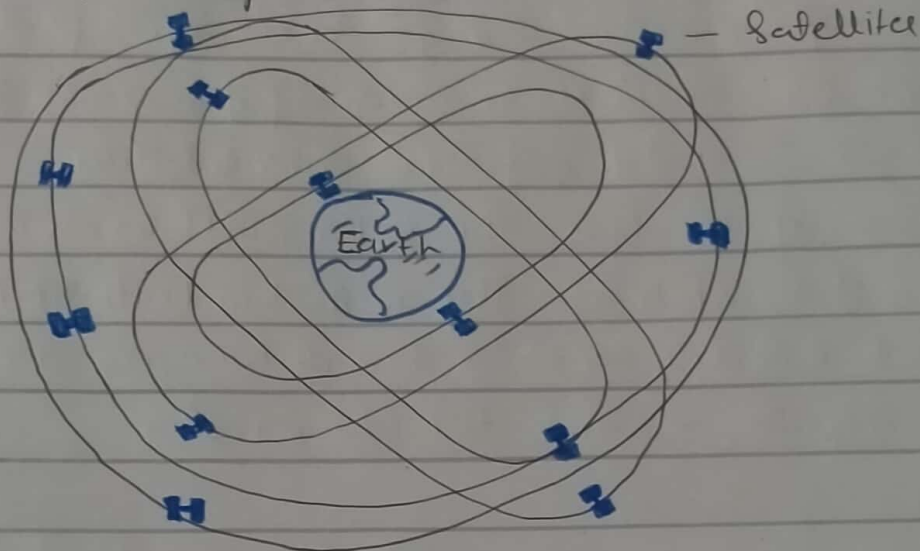


Figure: GPS Satellites.

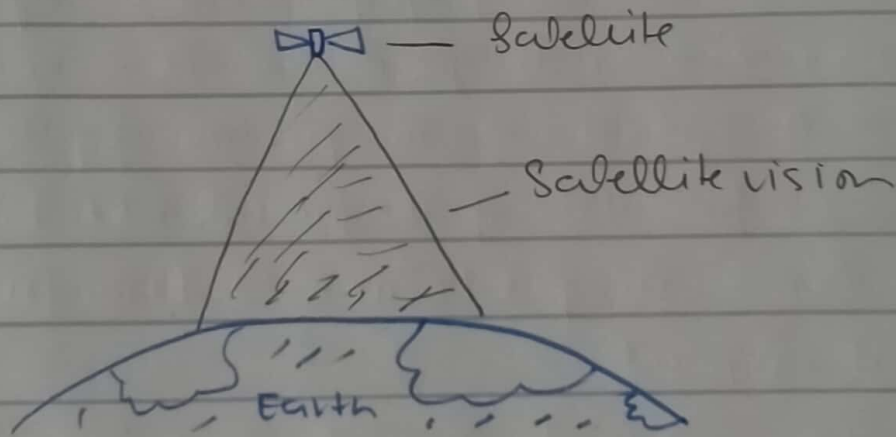


Figure: GPS Satellite vision

## 2. How does GPS work?

The Global Positioning System works through three main segments:

### 2.1 Space segment

The space segment comprises a constellation of satellites orbiting the earth. The U.S. Air Force develops, maintains and operates the space segment.

The US ensures the maintaining of the availability of at least 24 operational GPS satellites, 95% of the time. The GPS satellites are in one of six orbits and fly in medium Earth Orbit. Each satellite circles the earth twice, and contains a computer, an atomic clock, and a radio.

### 2.1.1 Triangulation

GPS receivers use a method called triangulation to determine their geographic location. Any GPS receiver, on the ground, contains a computer that 'triangulates' its own position by getting bearings from three of the four satellites. The location accuracy is between 10-100m for most equipment.

The process of Triangulation is depicted as follows:

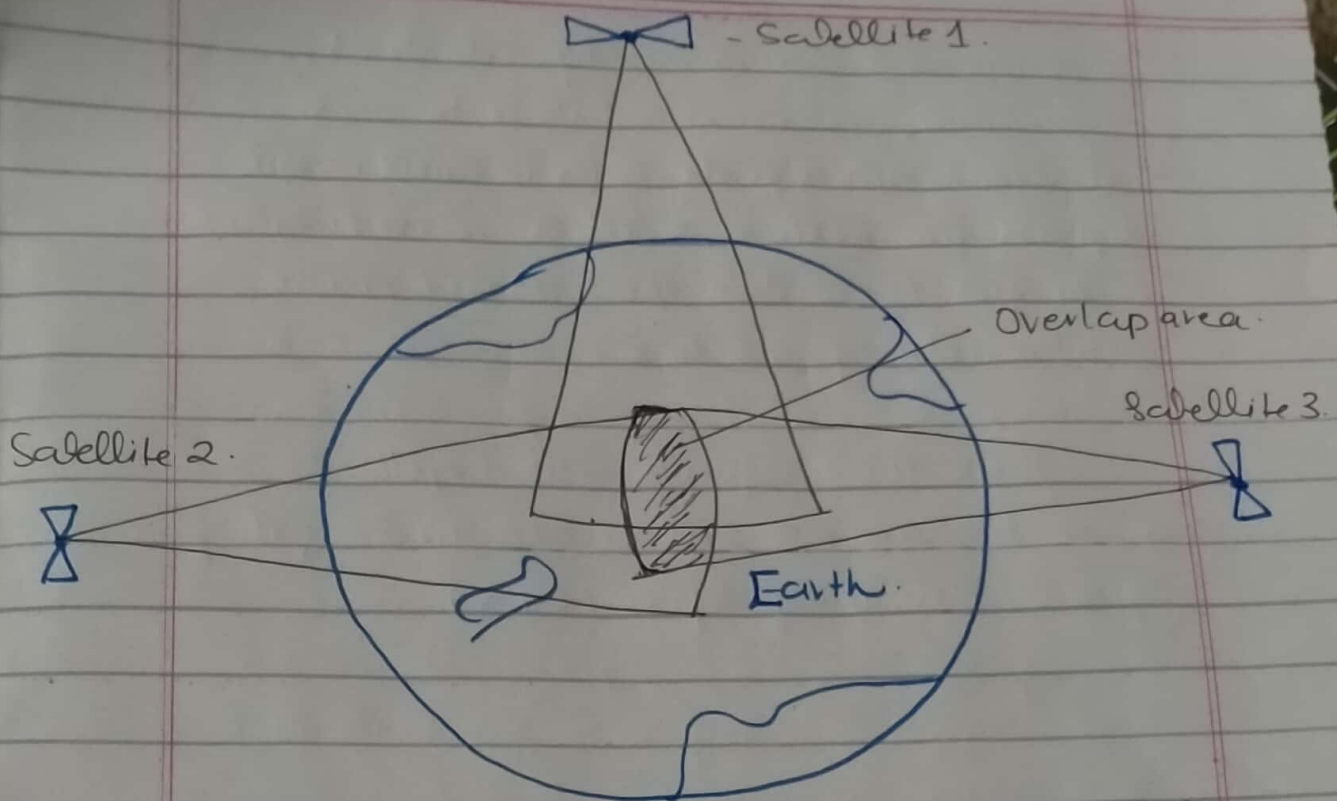


Figure: How GPS works (Triangulation)

## 2.2 Control Segment

The Control Segment consists of a global network of ground stations responsible for monitoring, controlling, and maintaining the GPS satellite constellation. These ground stations track the GPS satellites, monitor their signals, and upload updated navigation data and satellite commands.

## 2.3 User Segment

The User Segment includes all the GPS

receivers and devices used by individuals, organizations, and various industries to access and utilize GPS signals. GPS receivers receive signals from multiple satellites and use trilateration techniques to calculate their precise position, velocity, and time.

These three segments work together to ensure the accurate and reliable functioning of the Global Positioning System (GPS).