

Q What is GPS? How does it work?
What is GPS?

Ans Global Positioning System (GPS) is a satellite based navigation system that helps to determine location, velocity and time to air, sea and land users in all weather conditions anywhere around the globe. It provides advanced capabilities to civil, military and commercial users in the world. This system is developed for and funded by the US Department of Defence. Bradford Parkinson, an American engineer and inventor, is known as the father of GPS. The Global Positioning System (GPS) is consists of three (3) segments, which are:

- i) Space segment
- ii) Control segment
- iii) User segment

Following are the explanations of above mentioned segments of GPS.

Space Segment

The space segment of the Global Positioning System (GPS) is the part of the system that resides in space. It consists of 24 satellites, orbiting the Earth at an altitude of approximately

20,200 km (12,550 miles). These satellites transmit radio signals that contain information about their position and time, which GPS receivers on Earth use to determine their own location. These satellites are positioned in medium Earth orbit (MEO), which means they orbit the Earth at a higher altitude than lower Earth orbit (LEO).

Control segment

The control segment of the Global Positioning System (GPS) is a network of ground-based stations that monitor and maintain the GPS satellites, ensuring their accuracy and reliability. This segment is crucial for ensuring the accuracy and reliability of GPS data used by billions of users worldwide.

User Segment

The user segment of a GPS system refers to the devices and equipments used by individuals and organizations to receive and utilize GPS signals for navigation, positioning, and timing. This segment includes GPS receivers

in vehicles, smartphones, tablets, specialized survey equipment, and various other devices. The user segment consists of all GPS receivers on Earth. These receivers are responsible for receiving signals from GPS satellites, calculating distance and determining the user's position, velocity, and time.

How GPS works?

Global Positioning System (GPS) works by using a network of satellites to calculate a device's location on Earth. GPS satellites continuously broadcast their location and time using radio waves. These signals are very precise. Then GPS receivers, such as those in smartphones, cars and other devices, listen for these signals. The GPS receiver measures the time it takes for signals from each satellite to reach it. Since the speed of signals is known (speed of light), the receiver can calculate the distance to each satellite. By determining the distance to at least three satellites, the receiver can calculate its 2D position (latitude and longitude). With four or more satellites, it can determine its 3D position, including altitude.