

GPS, which stands for Global Positioning System, is a radio navigation system that allows land, sea, and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world. The capabilities of today's system render other well-known navigation and positioning technologies—namely the magnetic compass, the sextant, the chronometer, and radio-based devices—impractical and obsolete. GPS is used to support a broad range of military, commercial, and consumer applications.

What is GPS?

GPS (Global Positioning System) is a satellite-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth's surface. It is used by a wide variety of users, from hikers and fishermen to pilots and truck drivers.

How does GPS work?

- GPS consists of three main components: a constellation of satellites in orbit, a ground control segment, and a user equipment segment. The satellites orbit at an altitude of approximately 10,600 miles and transmit signals to the ground stations and to the user equipment.
- The ground control segment consists of a network of ground stations that monitor the satellites and provide them with precise timing and orbital data. The user equipment segment consists of a receiver that receives signals from the satellites and calculates the user's position and time.
- GPS works by measuring the time it takes for signals to travel from the satellites to the receiver. The receiver knows the speed of light and the time of transmission, so it can calculate the distance to each satellite. By knowing the distance to three or more satellites, the receiver can determine its position in three dimensions (longitude, latitude, and altitude).
- GPS receivers can also determine time to within a few nanoseconds. This is because the satellites have atomic clocks that are extremely accurate. The receiver can compare its own clock to the satellites' clocks and adjust its time accordingly.

[24 GPS satellites](#) (21 active, 3 spare) are in orbit at 10,600 miles above the earth. The satellites are spaced so that from any point on earth, four satellites will be above the horizon. Each satellite contains a computer, an atomic clock, and a radio. With an understanding of its own orbit and the clock, the satellite continually broadcasts its changing position and time.

(Once a day, each satellite checks its own sense of time and position with a ground station and makes any minor correction.) On the ground, any GPS receiver contains a computer that "triangulates" its own position by getting bearings from three of the four satellites. The result is provided in the form of a geographic position - longitude and latitude - to, for most receivers, within a few meters.

If the receiver is also equipped with a display screen that shows a map, the position can be shown on the map. If a fourth satellite can be received, the receiver/computer can figure out the altitude as well as the geographic position. If you are moving, your receiver may also be able to calculate your speed and direction of travel and give you estimated times of arrival to specified destinations. Some specialized GPS receivers can also store data for use in Geographic Information Systems (GIS) and map making.

The GPS is owned and operated by the U.S. Department of Defense but is available for general use around the world.

- 21 GPS satellites and three spare satellites are in orbit at 10,600 miles above the Earth. The satellites are spaced so that from any point on Earth, four satellites will be above the horizon.
- Each satellite contains a computer, an atomic clock, and a radio. With an understanding of its own orbit and the clock, it continually broadcasts its changing position and time. (Once a day, each satellite checks its own sense of time and position with a ground station and makes any minor correction.)
- On the ground, any GPS receiver contains a computer that "triangulates" its own position by getting bearings from three of the four satellites. The result is provided in the form of a geographic position - longitude and latitude - to, for most receivers, within 100 meters.
- If the receiver is also equipped with a display screen that shows a map, the position can be shown on the map.
- If a fourth satellite can be received, the receiver/computer can figure out the altitude as well as the geographic position.
- If you are moving, your receiver may also be able to calculate your speed and direction of travel and give you estimated times of arrival to specified destinations.

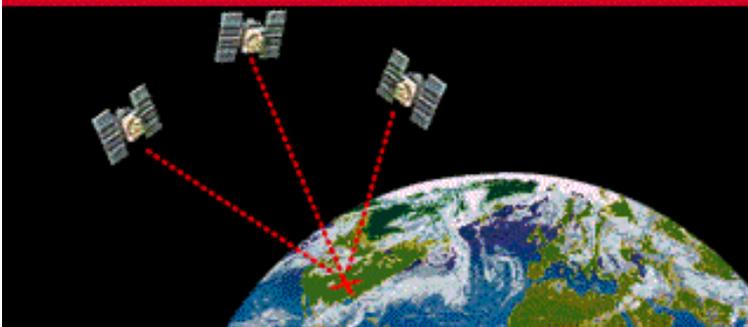
- **What is GPS?**

The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations.

- GPS uses these "man-made stars" as reference points to calculate positions accurate to a matter of meters. In fact, with advanced forms of GPS you can make measurements to better than a centimeter!
- In a sense it's like giving every square meter on the planet a unique address.
- GPS receivers have been miniaturized to just a few integrated circuits and so are becoming very economical. And that makes the technology accessible to virtually everyone.
- These days GPS is finding its way into cars, boats, planes, construction equipment, movie making gear, farm machinery, even laptop computers.
- Soon GPS will become almost as basic as the telephone. Indeed, at Trimble, we think it just may become a universal utility.

How it works

Satellites are reference points for locations on earth



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