

AGPS

This article provides a brief overview of GPS and Assisted GPS (A-GPS).

GPS

GPS signals arrive at 50 bits/second, in frames that are 30 seconds long each. They contain:

- The time. Each satellite is basically just an atomic clock, constantly transmitting the time. Because signals take time to reach the receiver, the time is always in the past. How far in the past tells you how far away the satellite is. If you know where the satellites are, and by comparing the time differences from different satellites, you can work out where you are.
- The *ephemeris*. This gives precise orbital information for the satellite, helping the receiver work out where the satellite is right now.
- The *almanac*. This gives rough orbital information for all the satellites.

The almanac is large, and must be transmitted in 25 parts, one part in each 30 second frame. That means that to receive all of it takes 12.5 minutes. However, once received, it is useful for a couple of months, and will be updated constantly if the GPS device is used regularly. Some GPS receivers require the entire almanac before they can get a fix, meaning that a device that has not been used for some time can take a long time to get a fix.

Because each frame takes 30 seconds, getting a GPS fix never takes less than 30 seconds.

Because GPS gives you a four-dimensional fix (latitude, longitude, height-above-sea-level and time), you need signals from four satellites to get a fix. However, if you know something about where you are, you can start off with a guess about your location, and refine it as each new satellite is acquired. For example, you can make a fair guess that you're on the surface of the Earth, which instantly cuts down the number of places you can possibly be.

Assisted GPS

Assisted GPS (A-GPS) uses an internet connection to help the process of getting a fix move faster. There are two main things the device might get from the A-GPS server.

1. The almanac. You can receive this much, much faster from the internet (even at the most basic of mobile phone speeds) than you can from satellites.
2. First guess at location. Two things you might get here:
 - Time. This gives you a reasonable guess at one of your four dimensions.
 - Location. For example, the location of the mobile network base-station you're connected through (which is probably well known) and its range, gives you a first guess at location perhaps as accurately as 100m.

If you get a first guess, you instantly get a (rough) location, and each new satellite that is acquired will improve the accuracy. This means that, not only do you get an immediate first fix, but you get a more accurate fix without having to acquire all four satellites.

Assisted GPS Without an Internet Connection

Basically, without a connection, you lose the "assisted" part. But the GPS still works. It will just take longer to get a fix.

References

- [GPS](#)
- [GPS](#) 

