Who Owns The GPS?

By Jim Siegel, Space Insights

Most people are now familiar the use of GPS (Global Positioning System) on their smart phones or cars to identify their location and provide directions to a destination.

But who owns the satellites that provide this service? For example, does Ford operate a satellite to give me on directions on my Ford Explorer?

Photo credit: Car and Driver

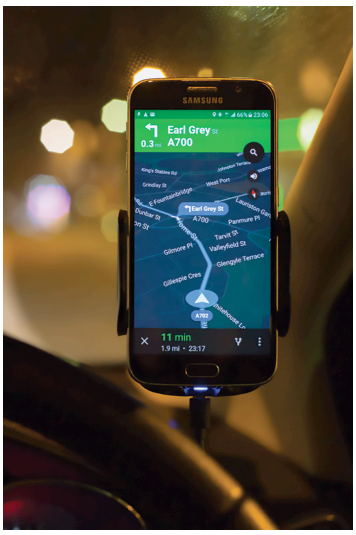

Photo credit: Comtech

The answer may surprise you. There is one, and only one, GPS system … the primary GPS system for the entire world … the world's premier space-based positioning, navigation, and timing service. Endeavors such as mapping, aerial refueling, rendezvous operations, geodetic surveying, and search and rescue operations have all benefited greatly from GPS's accuracy.

The GPS system is operated by the United States Space Force! Yes, the U.S. military makes possible the GPS system on your car, computer and smart phone. (Memo: the Russians and Chinese are reportedly building their own regional systems, but are believed no where close to the Space Force system.)

Photo credit: U.S. Space Force

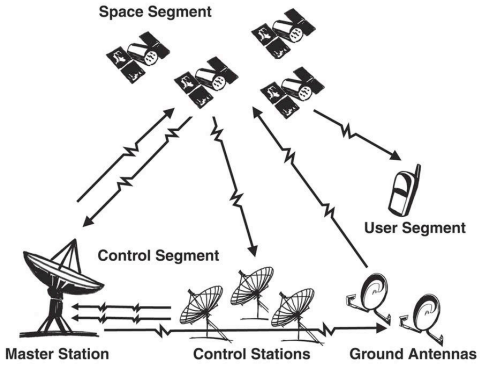

Photo credit: General Technical Information

GPS operates on the basis of a satellite constellation orbiting roughly 12,000 miles above the earth, the region known as MEO (medium earth orbit), supported by six monitor stations and four ground antennas around the globe. Satellites are organized into six orbital planes, each with a minimum of four satellites. Rather than being geosynchonous (stationary above one fixed point above the earth), each satellite orbits the earth every 12 hours.

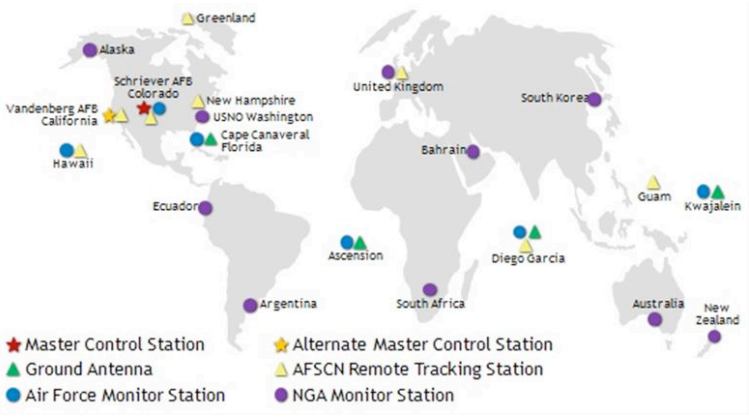

Photo credits: U.S. Military

The first GPS satellite known as Navistar 1 was launched in 1978, followed by 9 others of this Block I design. Subsequent design series included Block II (1989), Block IIA (1990), Block IIR (1997), and Block IIR-M (2005). Block IIIA is the first series of third generation GPS satellites, built by Lockheed Martin. The first, named Vespucci was launched in 2018, and the second named Magellan in 2019.

While still in its initial limited capabilities, President Reagan directed that the GPS system would be available for civilian use, albeit intentionally degraded (selective availability). The GPS system became fully operational in April 1995. President Clinton directed in 2000 to turn off selective availability to provide the same accuracy to civilians that was afforded to the military. It's my understanding that the Department of Defense has developed measures to prevent the hostile use of GPS and its augmentations to ensure that the U.S. retains a military advantage without unduly disrupting or degrading civilian uses.

The third satellite in this GPS IIIA series is scheduled for launch on June 30, 2020 by SpaceX from SLC-40 at Cape Canaveral Air Force Station. It is designated as GPS III SV-03 and is named Columbus.

GPS IIA SV-03 Columbus Photo credit: Lockeed Martin

Space Launch Complex 40, CCAFS Photo Credit: SpaceX

Prior to that launch there were 31 satellites operating in the constellation. Columbus will replace an existing satellite that will be de-commissioned, still leaving 31 operational satellites.

A total of 74 GPS satellites have been launched since 1978; 31 are in operation, 9 are in reserve, and 2 are being tested. The remainder have been de-commsioned.

In a June 26, 2020, media press briefing, it was revealed that although the Columbus design does not differ significantly from the prior two GPS III satellites, it is the first to be produced from a formal state-of-the-art production line at the Lockheed Martin Processing Facility outside Denver, where GPS III SV05-09 are now in various stages of assembly and test. GPS III SV-04 is reportedly being readied for launch later this year, also by SpaceX.

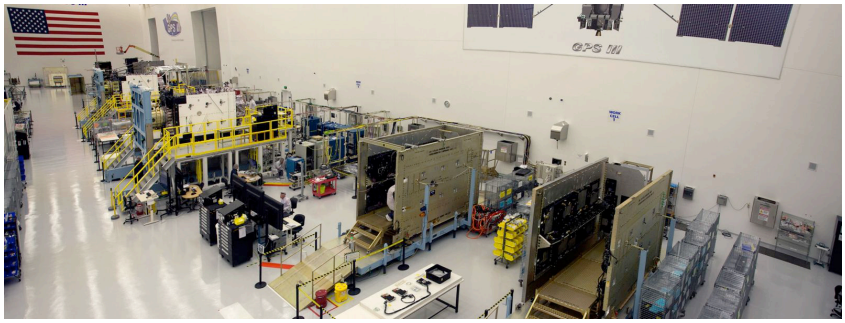

Photo credit: Lockheed Martin

Lockheed Martin is expected to soon complete its critical design review with the Space Force to begin production on the next design series and the first two GPS IIIF satellites under contract.

How accurate is the Space Force GPS system? The GPS III design series is reportedly three times more accurate than the prior designs. In the June 26 briefing, that accuracy was stated as about 24 inches. It is our understanding from prior briefings, however, that actual accuracy varies widely by the number and location of satellites involved in a specific measurement, and whether it is for civilian or military use. At the Vespucci press briefing in December 2018, the accuracy was noted as about 20 inches on average, and about 14 inches at best.

Photo credit: Birkey's Farm Store

Photo credit: U.S. Military

The United States government does not charge civilian organizations for use of the GPS system. How much does that cost taxpayers? The President has requested about $1.8 billion for the GPS program for fiscal year 2021.

So the next time you use the navigation display on your car to guide you to the restaurant across town or to visit Uncle Rick across the country, remember the cadre of Lockheed Martin, Space Force and Air Force staff that are making it possible, and the 31-satellite constellation orbiting silently and well out of sight nearly 60 times farther from earth than the International Space Station.

Photo Credit: U.S. Space Force

Photo Credit: Lockheed Martin

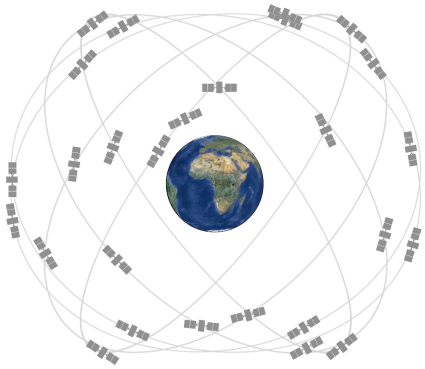

Photo Credit: U.S. Air Force