GPS Modernization Fact Sheet

Background

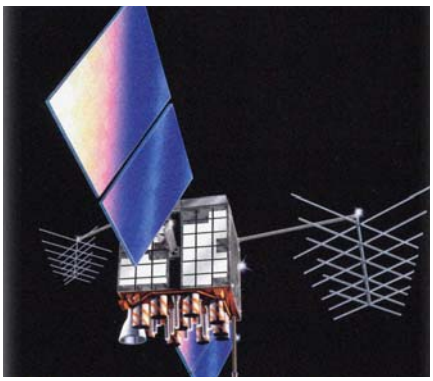
The purpose of the Global Positioning System (GPS) is to provide highly accurate positioning, navigation and timing data (globally, 24 hours a day, and in any type of weather) to civilian and authorized military users. GPS is comprised of three segments: space segment, control segment and user segment. The space segment consists of 24 or more satellites in six orbital planes, traveling in semi-synchronous (12-hour) orbits around the earth. These satellites broadcast navigation and timing signals on two frequencies (L1 and L2). The control segment, sometimes referred to as the ground segment, consists of a Master Control Station (MCS), a backup MCS, six dedicated monitor stations, and five ground antennas. The user segment includes countless civil and military GPS receivers used for air, land, sea and space applications. The GPS is operated and maintained by the Air Force.

GPS Modernization

Over the last decade, the US has implemented several improvements to the GPS service, including new signals for civil use and increased accuracy and integrity for all users, while maintaining backward compatibility with existing GPS equipment.

Perhaps the most significant improvement for civil and commercial users of GPS in the last decade was the President's decision on 1 May 2000 to permanently "turn off" the capability to degrade the civil signal.

GPS Satellites



Four generations of satellites have flown in the GPS constellation: Block I, Block II, Block IIA (Augmentation), and Block IIR (Replenishment). The 11 Block I satellites were used to test the principles of space-based navigation, and provide lessons learned for the development of later blocks. A combination of Block II, IIA and IIR satellites make up the current constellation.

Block IIRs began replacing older Block II and IIAs in 1997. There are currently twelve Block IIR satellites in orbit. Block IIR satellites boast significant improvements over the previous blocks. They have reprogrammable satellite processors enabling problem fixes and upgrades in flight. Eight Block IIR satellites are being modernized to radiate the new civil signal (L2C) on the L2 channel. The first modernized Block IIR (designated as the IIR-M) with L2C was launched on 26 September 2005.

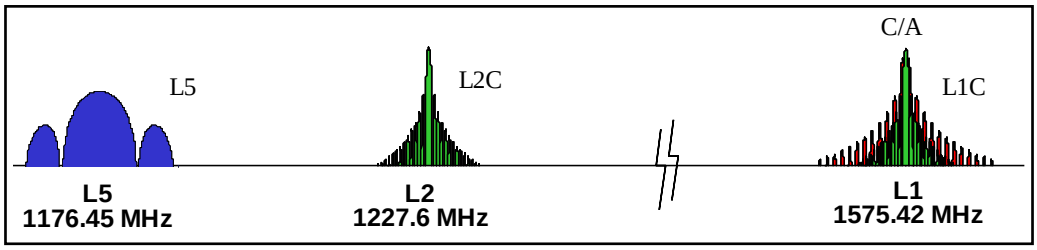
Block IIF satellites are the next generation of GPS space vehicles. Block IIF provides all the capabilities of the previous blocks with some additional benefits. Improvements include an extended design life of 12 years, faster processors with more memory, and a new civil signal on a third frequency (L5). The first Block IIF satellite is scheduled to launch in the near future.

Description of New Civil Signals

L2C (1227.6 MHz)
Although the L2C signal is currently available, the value of this signal to the civil user community will increase as additional satellites are introduced into the constellation. L2C enables the development of lower-cost, dual-frequency civil GPS receivers that allow for correction of ionospheric time delay errors. Once the control segment modernization is complete, enhancements such as dataless and pilot channels for improved performance and an improved navigation message with more precise clock and ephemeris information will be available. L2C will also be interoperable with the Quasi-Zenith Satellite System (QZSS) under development by Japan.

L5 (1176.45 MHz)
L5, which will be broadcast beginning with the first IIF satellite, will lie in the "Aeronautical Radionavigation Services" band and can be used for safety-of-life aviation. It will be compatible with Galileo, GLONASS, and QZSS, with the goal to be interoperable as well. L5 will transmit at a higher power than current civil GPS signals, and have a wider bandwidth. Its lower frequency may also enhance reception for indoor users.

L1C (1575.42 MHz)
An agreement signed by the United States and the Member States of the European Union on GPS and Galileo included a provision for a compatible and interoperable signal on the L1 frequency. L1C will be backward compatible with the current civil signal on L1, be broadcast at a higher power level, and include advanced design for enhanced performance.



Accuracy Improvements

The US Government continues to improve the GPS space and ground segments to increase performance and accuracy. As the constellation has been populated with Block IIR and IIR-M satellites, the positioning accuracy has gradually improved. In 2005, six new monitoring stations were incorporated into the ground segment providing greater visibility of the constellation and increasing the accuracy. GPS Block III will further improve the accuracy of the system by reducing the age of the navigation and clock information broadcast to users.