

First of New Generation of GPS Satellites Launched Into Orbit



Today, the Global Positioning System (GPS) is used worldwide for a wide range of navigation and timing uses. Many would literally be lost without GPS. GPS is also a key component of the Federal Aviation Administration's NextGen plans.

On March 24th, a significant milestone was achieved in the ongoing modernization of GPS. On this day, the first GPS satellite to transmit on a new GPS civil frequency was launched into orbit. This recently-launched satellite is the first to be able to broadcast on a third coded signal (L5 at 1176 MHz) for civil aviation users. GPS has traditionally been transmitted on only two civil frequencies (L1 and L2) with only one of these (L1) operating within a protected radio-navigation band.

With the availability of two protected civil frequencies (originally, L1, and now, L5), GPS can support improved performance for standalone GPS users as well as provide increased accuracy and availability of precision approach service for WAAS-equipped users. The launch of this first L5 satellite is a historic first step, but users will not begin seeing noticeable benefits until several L5 satellites have been introduced into the GPS constellation. The L5 signal for the satellite launched on March 24th is expected to begin broadcasting by mid-April. As each new L5-capable satellite is added to the GPS constellation, improvements in total system performance will accrue. Future launches of satellites with L5 capability will continue throughout the coming years until a full constellation of 24 satellites with both L1 and L5 are available by 2018. The FAA plans to transition the Wide Area Augmentation System (WAAS) to the new GPS dual frequency service to take advantage of the improved accuracy, availability and coverage of vertically guided approach service, particularly during increased solar activity.

Representatives from the Department of Transportation and members of the FAA's Navigation Services Directorate (ATO-W) work closely with the GPS Wing of the U.S. Air Force to support GPS modernization. The GPS-Wing, located at Los Angeles Air Force Base, manages the procurement of new GPS satellites. This includes coordination with multiple civil and military organizations to introduce continuous improvements to GPS. This coordination is critical in ensuring that the new generation of satellites meets the current and future navigation needs of the aviation community.

While other nations are also developing or enhancing existing satellite navigation systems, GPS is still considered the gold standard in satellite navigation. The Air Force GPS Wing, with support from the DOT and FAA, is helping to maintain this position of U.S. leadership.

GPS Civil Signal Overview

L1/CA (broadcast at 1575.42 MHz): Introduced in 1978 on the first GPS Block I satellite. Signal broadcast located within protected radio-navigation band.

L2C (broadcast at 1227.6 MHz): Introduced in 2005 on the first GPS Block II R-M satellite. Signal broadcast not located within a protected radio-navigation band, so cannot be relied upon in avionics for safety-of-life operations.

L5 (broadcast at 1176.45 MHz): Introduced in 2009 as the third civil frequency for GPS (the second of which resides within a protected radio-navigation band). A modified GPS Block IIRM satellite was used on March 24th to introduce L5 capability. All future GPS satellites to carry L5; however, will be on GPS Block IIF satellites.