

GPS



The technology behind GPS is relatively simple. A constellation of 24 satellites orbiting 11,000 miles above the earth emits signals to receivers on earth. By measuring the travel time of a signal transmitted from each satellite, a receiver can calculate its distance from that satellite. Satellite positions are used by a receiver as precise reference points to determine the location of the receiver. When receiving the signals from at least four satellites, a GPS receiver can determine latitude, longitude, altitude, and time.

In 1989 the Department of Defense (DoD) launched the first production series of GPS satellites. This effort was the initial step in revolutionizing the way we find our location on earth. The 24 satellite system was declared operational by the DoD on December 8, 1993. A similar declaration was made by the Federal Aviation Administration (FAA) in February 1994 regarding the civil operational status of GPS.

The overall objective of the FAA is to support the operational use of satellite navigation for all civil aviation needs including departure operations, terminal, oceanic, en route, non-precision and precision approaches, auto-landing, and surface navigation. Some of the incremental steps to achieve this goal have already occurred, many are currently underway, and more are planned for the near future.

The international community can expect many benefits from satellite navigation (GPS and its augmentations) including:

- ✓ Increased landing capacity down to Category III precision approach service to all runways and airports for all aircraft types
- ✓ Improved safety with reduced separation minimums resulting in increased system capacity and capabilities
- ✓ Increased flexibility to implement accurate area navigation by using efficient, optimized, user-preferred flight paths
- ✓ Improved ground and cockpit situational awareness to reduce runway incursions
- ✓ Significant reductions in aircraft operating costs



- ✓ Accurate position reporting to enable uniform high-quality worldwide air traffic management
- ✓ Consolidation of navigation functions into a single satellite-based system thereby enabling the potential phase-out of older navigation aids at substantial savings.

Additionally, the FAA is striving to enhance existing relations with other civil aviation authorities and appropriate organizations to create a seamless, worldwide satellite-based navigation system. Such a system will permit the use of a single piece of equipment to support aviation navigation on a global basis. Furthermore, it will provide the foundation for future communications, navigation, and surveillance systems and increase safety for carriers and passengers internationally.

In furtherance of international acceptance of GPS, on March 29, 1996, the President of the United States officially reiterated the U.S. commitment to continue the broadcast of GPS signals on a worldwide basis free of charges for the foreseeable future. The President also made a promise to discontinue the use of selective availability (SA) by the year 2006.

In January 1999, as a direct result of the benefits brought about by GPS, Vice President Gore announced that the U.S. would begin a GPS modernization to further extend the systems capability. This modernization would include two additional GPS signals to enhance the civilian and commercial service.

On May 1, 2000 the President announced that effective immediately, the use of SA would be discontinued. This will result in accuracies up to ten times more accurate than previously possible. All users worldwide will benefit from these commitments.

Although GPS and its augmentations can provide major benefits for navigation, especially for the civil aviation community, there are many steps that must be taken to implement this technology. Standards and procedures development, facility preparation, training, international cooperation, and many other activities play a critical role in bringing these systems into operational use. Based on the capability of GPS, the FAA has charted a course for the future and is working to build a new navigation capability--one that will guide our Nation's Airspace System into the 21st century.

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April 30, 2000