The Federal Aviation Administration (FAA) commissioned the Wide Area Augmentation System (WAAS) as a safety of life air navigation service on July 10, 2003. The agency has continually improved the system in the years since then. These system improvements have increased the WAAS service area, availability, and reliability. Each development kept the WAAS aviation users in mind so they would have the most reliable and accurate service available.

WAAS provides consistent service to users throughout the service area for all phases of flight. The system delivers an accurate position solution, typically one to two meters, no matter where the user is in the WAAS service area. This accuracy is a significant improvement over the typical accuracy obtained using GPS alone. WAAS also provides timely integrity for the GPS signal. If a GPS satellite unexpectedly provides erroneous signals, the WAAS will detect this failure and mark that satellite as “not usable” within six seconds. The WAAS also provides integrity parameters that ensure that WAAS accuracy is within integrity bounds. With very high probability, the user is assured the information WAAS is transmitting will result in a safe and accurate position.

WAAS offers many benefits in approach operations. GPS alone does not meet the aviation requirements for availability, accuracy, and integrity for different phases of flight, such as final approach. WAAS allows pilots to use satellite navigation to perform a precision approach down to a 200-foot decision height with a one-half mile visibility.

WAAS has opened up thousands of runways to aviators who previously did not have access to a precision approach capability. The FAA has published 3,498 Localizer Performance with Vertical guidance (LPV) approaches, 2,321 to runways with no ILS capability, by November 13, 2014. LPV approaches are very similar to ILS approaches, from the pilot’s perspective.

The figures below show the evolution of WAAS service. The dark red color in each picture shows where WAAS LPV is available 100% of the time. Outside that dark red color, the WAAS availability reduces until the color is blue. The blue color indicates where the WAAS LPV service is available 85% of the time. WAAS LPV service is available less than 85% of the time in the white area of the pictures.

The left picture shows WAAS LPV service coverage on September 4, 2003. The center picture shows WAAS LPV service coverage on September 28, 2007. This is the performance after new reference stations in Alaska, Canada, and Mexico were added to WAAS. The right picture shows WAAS LPV service coverage on September 24, 2014. It clearly shows that LPV service
is available 100% of the time in a large portion of North America. The current level of service compared to previous service is attributable to several system changes that increased the robustness of WAAS.

WAAS enables the FAA to reduce operations costs by decommissioning ground-based navigational aids. For example, the FAA is moving from a VOR-based route structure to a Performance Based Navigation (PBN) route structure. Aircraft can fly direct routes instead of the VOR defined routes. The new routes that WAAS enables are called “T” and “Q” routes. T routes are low altitude Area Navigation (RNAV) routes (less than 18,000 feet) and Q routes are RNAV routes at higher altitudes (18,000 - 45,000 feet). These routes also can be flown using GPS without being augmented by WAAS. Also, the number of operational VORs in the NAS can be reduced. The FAA is now developing the plan to reduce the number of VOR transmitters in the United States, as well as the number of Instrument Landing Systems (ILS).

The FAA’s policy calls for any new Category I precision approach to be an LPV approach. Aviation use of WAAS continues to grow. More than 100,000 aviation-certified WAAS receivers have been sold, as of September 30, 2014. The FAA estimates that nearly 80,000 aircraft are equipped with the WAAS-LPV capability. FAA analysis also shows an increase in the number of approaches during instrument meteorological conditions (IMC), and those increases are being attributed to the substantial number of LPV approaches available. Many LPV approaches are published to runway ends that do not have an existing ILS, yet even the runways with an ILS offer greater access and flexibility to pilots who fly LPV using WAAS. For example, a runway with ILS and LPV instrument approach procedures would still support a precision approach if the ILS is out of service.

There are many non-aviation users of WAAS, even though the FAA developed it for aviation use. The system’s repeatable and precise positioning supports applications for farming, boating, hiking, surveying, and other many uses. Many GPS chip manufacturers now include WAAS in their chip designs. These GPS/WAAS chips are in many consumer GPS products such as cell phones, automobile navigation units, and other products. The FAA recognizes that WAAS has become a national utility that makes GPS better, even though the FAA does not keep track of non-aviation uses of WAAS.

The future of WAAS includes updating the system with the latest technologies. The FAA will update the WAAS reference station receivers to receive the full set of signals transmitted from GPS satellites. Other components of the WAAS will also continue to be upgraded to ensure the availability of replacement parts in case of component failure.

The FAA also will ensure the WAAS geostationary satellite constellation, currently at three satellites, continues to provide the WAAS corrections to users. The FAA is pursuing new satellite leases with satellite providers as the current geostationary satellite constellation ages. Other future enhancements to WAAS include providing a dual frequency capability that will take advantage of the two civilian GPS frequencies, L1 and L5. When the L5 signal is ready for operation and is being transmitted by a proper number of GPS satellites, the WAAS will be ready to provide dual frequency service to users. Other future enhancements include adding other Global Navigation Satellite System (GNSS) constellations, such as Galileo.

WAAS has been operational for more than 11 years. The system continues to provide accurate and reliable augmentation to GPS. The FAA will ensure that the current level of service will continue and future service will become even better than it is today.

- William Wanner, Manager, Navigation Systems Verification and Monitoring Brand, FAA
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