

North American Satellite Augmentation System

NASAS



BACKGROUND

The transition to satellite based navigation technology is a high priority of both the International Civil Aviation Organization (ICAO) and the Federal Aviation Administration (FAA). Both are jointly committed to a full and expedient transition to satellite-based navigation systems for aviation operations. In support of this, the FAA has been assisting ICAO for many years to help create this seamless Global Navigation Satellite System, or GNSS.

WHAT IS NASAS?

A coalition of states/countries to establish a common standardized aviation service capability for navigation and landing which provides cost benefits and savings to all participants. Using ICAO guidelines as a basis, the participants have entered into Agreements that will allow for state autonomy of operations and service and provide for a common good while requiring fewer resources to achieve current or greater individual state capabilities.

In a more direct effort to facilitate and expedite this capability within North America, the FAA has committed to assist ICAO, Canada, Mexico, and others in developing a common technical capability and general implementation path for satellite navigation applications for this region. This regional strategy and plan will ultimately create a North American Satellite Augmentation System (NASAS) that is based on satellite navigation technologies.

The NASAS will support uniform implementation of GPS throughout the North American region, and include a regional wide area augmentation system (WAAS) capability which can be tailored to each state. This capability can then be supplemented by country-specific local area augmentations (LAAS), as needed for more precise terminal area navigation. This effort could also include operational participation from

countries external to North America, such as Iceland, Panama, and possibly Bermuda, in an effort to improve coverage on the outer edges of North America and provide transition services to other regions (Europe, the Caribbean and South America).

HOW NASAS WORKS

Wide-Area Reference Stations (WRSs) from Canada, Mexico, and others will be linked to a WAAS network to form the basis of the NASAS. Signals from GPS satellites will be received and any errors in the signals are then determined. Each station in the network relays the data to a Wide-Area Master Station (WMS) where correction information for the entire geographical area is computed. A correction message is prepared and uplinked to another satellite that is then broadcast over the entire region. This correction message will improve GPS signal accuracy from 100 meters to approximately 7 meters.

CAN/MEX/USA TEAM

In addition to securing technical participation from these countries, the FAA has taken the initiative to establish a vehicle within the Canada, Mexico, USA (CAN/MEX/USA) CNS/ATM Working Group to begin to coordinate the operational implementation activities for the NASAS. This group will address many issues, including the following:

1. Phased implementation of service levels
2. Phased implementation of benefits
3. Phased decommissioning
4. Operational procedures
5. Service performance requirements
6. Contract acquisition development
7. Operations and maintenance

CURRENT STATUS

Canada, Mexico, Iceland, and Panama have already stated their respective intentions to participate in the operational WAAS. Currently, the FAA has fielded all



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of the operational equipment for the Phase I WAAS and is currently performing overall system testing activities that will support an initial operating capability in September 2000.

Canada and Iceland have been actively involved in WAAS and LAAS Research and Development (R&D) activities for many years, and have been an integral part of the National Satellite Test Bed (NSTB) with several reference station locations in Canada. Canada is already outlining their proposed network of operational WAAS reference stations that will be included into the U.S. WAAS architecture.

The installation of three NSTB reference stations in Mexico and one reference station in Panama will be complete by early 2000. Once these test stations are online, a North American testbed will have been established that will afford the opportunity to conduct operational analyses to determine the final NASAS architecture.

BENEFITS

Cost...Participation from other nations will result in significant cost savings for all authorities involved. It is projected that the FAA will save approximately \$50M in deferred reference station implementation costs as a result of Canada and Mexico participation.

Standardization...The NASAS will also expand the operational boundaries in which WAAS service will be provided, and is an integral step to transition North America from ground-based systems to a seamless augmentation system based on GPS.

Operational...Satellite navigation implementation throughout North America will provide substantial benefits to service providers in the U.S., Canada and Mexico as well as to the individual and combined user communities. Through the creation of the NASAS, North America will implement an operational system that will provide the following benefits to aviation:

- ✓ *Enhanced safety of flight.*
- ✓ *Create a seamless navigation service based on a standardized navigation service and common avionics.*
- ✓ *More efficient, optimized, flexible, and user-preferred route structures.*
- ✓ *Increased system capacity.*
- ✓ *Reduced separation minimums that will result in increased capacity and capabilities.*
- ✓ *Significant savings from shortened flight times, reduced fuel consumption and reduced aircraft maintenance.*

- ✓ *Reduced costs while increasing overall benefits for the North American region.*
- ✓ *Reduced or elimination of maintenance and operation of unnecessary ground-based systems.*
- ✓ *Improved ground and cockpit situational awareness.*
- ✓ *Increased landing capacity for aircraft and helicopters.*

Total Transportation...In addition to aviation benefits, other modes of transportation will also benefit from the increased accuracy, availability, and integrity that the NASAS will deliver to all potential users. These modes include:

- ✓ Marine Applications
- ✓ Rail Applications
- ✓ Surface Applications
- ✓ Public Safety Applications
- ✓ Agriculture Applications
- ✓ Surveying Applications
- ✓ Recreation Applications
- ✓ Timing Applications
- ✓ Environmental Applications
- ✓ Space Applications

CONCLUSION

The implementation of NASAS will create a common navigation system that will extend from the Arctic Circle in Canada to the northern tip of South America. It will provide a monumental increase in safety for all air carriers, as well as standardize navigation aids and associated avionics throughout the region. When looking at the bottom line, it will also save millions of dollars in implementation, operation, and maintenance expenses for all participants.

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