

FOURTH MEETING OF THE ALLPIRG/ADVISORY GROUP**(Montreal, 6 - 8 February 2001)****Agenda Item 6: Technical cooperation issues****RLA/00/009 MULTINATIONAL PROJECT ON REGIONAL GNSS AUGMENTATION TEST****(Presented by the Chairman of GREPECAS)****INFORMATION PAPER****SUMMARY**

This paper provides information on the RLA/00/009 multinational project prepared by ICAO with the assistance of the US/FAA, to carry out a regional GNSS augmentation test in the CAR and SAM Regions.

1. INTRODUCTION

1.1 The global navigation satellite system, or GNSS, consisting of the satellite navigation system including *interoperable* regional and local augmentation systems, which will be *economically viable* for all service providers, improve *efficiency* for all users, and benefit *all modes of transportation*, as well as multiple non-transportation related applications.

1.2 Transitioning to the use of satellite technology by aviation is, according to ICAO policies, a high priority for States of the Caribbean (CAR) and South American (SAM) Regions and the United States Federal Aviation Administration (FAA).

1.3 CAR/SAM States and the US/FAA have considered the possibility of a multinational cooperation to carry out regional tests in furtherance of the seamless, global navigation satellite system (GNSS) that has been endorsed by ICAO.

1.4 In March 1999, the FAA reiterated its commitment to the regional and global implementation of GNSS and its augmentations, including FAA assistance to ICAO and its member States with this revolutionary transition. To further this commitment, the FAA will provide the wide area augmentation system (WAAS) test bed reference stations required to implement an operational implementation test and evaluation plan in the CAR/SAM Regions.

2. TRANSITION TO NEW TECHNOLOGY

2.1 To overcome inherent system limitations and to meet the performance requirements (accuracy, integrity, availability and continuity) for all phases of flight, GPS requires varying degrees of augmentation.

2.2 For ground-based augmentation systems (GBAS), also referred as local area (LAAS), a monitor is located at or near the airport where precision operations are desired. Signals are sent directly to the aircraft in the vicinity [approximately 37 km (20 NM)]. These signals provide corrections to increase the position accuracy locally along with satellite integrity information. This capability requires data link(s) between ground and aircraft.

2.3 Since it is not practical to provide coverage with ground-based systems for all phases of flight, one way to provide augmentation coverage over large areas is to use satellites to transmit augmentation information. This is known as a satellite-based augmentation system (SBAS), also referred to as wide area (WAAS) or regional augmentation.

2.4 The provision of satellite-based augmentation by geostationary satellites has certain limitations and therefore cannot be expected to support all phases of flight, especially precision approach and landing of higher categories. Since these satellites orbit above the equator, their signals would not be available in polar regions and may be masked by aircraft structure or terrain. This suggests that other GNSS augmentation satellite orbits and/or ground-based augmentation might need to be considered to alleviate these shortcomings.

3. THE SITUATION IN THE CAR/SAM REGIONS

3.1 The challenge is to bring the individual implementation efforts currently being planned and executed within the CAR/SAM Regions into a single, cohesive effort to provide a regional satellite navigation capability for all phases of flight.

3.2 To facilitate and expedite this satellite navigation transition within the CAR/SAM Regions, the FAA is able to provide expertise to assist ICAO in developing a common direction and general implementation path in regards to GNSS and its augmentation technologies.

3.3 In order to demonstrate the feasibility of a transition to the new technology, taking advantage of the US/FAA and other two States of the region availability to cooperate with the inputs required, a multinational project to carry out a series of tests in several international airports of the CAR/SAM Regions has been designed and proposed to concerned States.

4. PROJECT OBJECTIVE

4.1 The project is aimed at implementing a test and evaluation plan on the technical and operational benefits of the US/FAA wide area augmentation system and local area augmentation system in the CAR/SAM Regions, to assist in the establishment of the satellite navigation operational model being developed by the GREPECAS CNS/ATM Implementation Coordination Subgroup.

5. EXPECTED OUTPUTS

5.1 In order to achieve the project objective, as a result of a three year assistance to be implemented in several CAR/SAM States with the participation of US/FAA specialists and equipment, in association with the Brazilian and Chilean civil aviation administrations, the following project outputs have been defined:

- a) CAR/SAM test bed operational test and evaluation plan developed and approved;
- b) GPS approach procedures for test flight to exercise the WAAS component in each participating State at one airport;
- c) development and refinement of operational standards and procedures for use and approval of satellite-based navigation systems;
- d) preparation for test and evaluation data collection and analysis in each participating State (equipment installation site survey and installation plan);
- e) regional flight test plan developed for testing and evaluation of cooperative concepts and architecture for an integrated satellite navigation system;
- f) regional flight test report to include each sub-region test bed airborne segment analysis and reports for the regional tests;
- g) State flight test plan developed for testing and verification of satellite navigation concepts in each participating State;
- h) preparation for testing and evaluation of the performance of the test bed for all phases of flight down to and including CAT I precision approaches;
- i) State flight test plan;
- j) State flight test report completed to include each sub-region test bed airborne segment analysis and reports at the State level;
- k) State operational implementation strategy/plan. Reduction of the risks and removal of the barriers involved with a future implementation of satellite navigation in the CAR/SAM Regions;
- l) State/regional training plan. Technical and operational experience and training provided to facilitate the implementation of a satellite navigation system;
- m) State/regional cost/benefit analysis. Provision of data and information for the development of a verifiable cost/benefit analysis;
- n) State/regional satellite navigation architecture (hardware/software/ communications). Provision of convincing technical proof of concept to initiate funding to start the implementation of satellite navigation in the CAR/SAM Regions; and
- o) operational training programmes available for all participants in the test programme (including training support as requested).

6. PARTICIPATION IN THE PROJECT

6.1 The following States and organization are expected to participate in the project: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Panama, Paraguay, Peru, Trinidad and Tobago, United States, Uruguay, Venezuela and COCESNA.

6.2 Brazil and Chile will provide their already installed WAAS test bed reference and master stations and the services, as required, of flight testing aircraft equipped with GPS/WAAS avionics; Brazil will also provide uplink facilities, and the US/FAA will facilitate the use of ground equipment required, the participation of four specialists and the conduction of training involved.

6.3 All other participant States and organization will provide the counterpart local staff, facilities and logistics support required to develop project activities as per a project work plan to be prepared once project operations start, and will equitably finance the project costs involved on a cost sharing basis.

6.4 The three-year duration project, designed under the UNDP/ICAO modality, is expected to start operations in the first half of 2001.

7. ACTION BY THE MEETING

7.1 The meeting is invited to note the information in this paper.