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North American, Central American and Caribbean Office (NACC)
Tenth Meeting of Directors of Civil Aviation of the Central Caribbean (C/CAR/DCA/10)
Grand Cayman, Cayman Islands, 18 to 21 August 2009

Agenda Item 7: Regional and Technical Co-operation Matters

7.2 Other Cooperation Matters

ICAO Regional Technical Cooperation Project RLA/03/902 –*Transition to GNSS in the CAR/SAM Regions – Augmentation Solution for the Caribbean, Central and South America* (SACCSA)

(Presented by the Secretariat)

SUMMARY

This working paper presents the objectives and results of RLA/03/902 Phase III Project regarding the GNSS implementation and proposes the Meeting to urge Central Caribbean States and Territories to participate in this Project.

References:

- RLA 03/902 RCC/E Meeting Report. San Jose, Costa Rica, 24 April 2009 (only avialable in Spanish)
- RLA/03/902 Project Document
- ICAO Global Air Navigation Plan (Doc 9750)
- GREPECAS/15 Meeting Report

Strategic Objectives	*This paper is related with the Strategic Objectives:* A: Safety - *Enhance global civil aviation safety* D: Efficiency - *Enhance the efficiency of aviation operations* E: Continuity - *Maintain the continuity of aviation operations*

1. Introduction

1.1 The ICAO Global Air Navigation Plan (Doc 9750) through GPI-21 – *Navigation Systems*, establishes the strategy for enabling the introduction and evolution of performance-based navigation supported by a robust navigation infrastructure providing an accurate, reliable and seamless global positioning capability.

1.2 Additionally, the Global Air Navigation Plan, establishes that for the medium and long term GNSS applications, the existing and future navigation systems will be used, with some type of augmentation or combination of augmentations required for operation in a particular phase of flight. For which, the decisions of the CAR/SAM States, Territories and International Organizations for GNSS implementation such as: Satellite-based augmentation system (SBAS) and Ground-based augmentation System (GBAS) should be based on results of technical-financial studies that fully justify the feasibility and the cost/benefit of augmentations.

1.3 The ICAO SARPs establish that for the introduction of new GNSS navigation elements, the State should evaluate the navigation systems with respect to four essential criteria: accuracy, integrity (including time-to-alert), service continuity and availability.

1.4 GREPECAS, through its Conclusion 15/43 – *Support for RLA/03/902 Project – SACCSA*; did not object the purpose, nor the activity plan of the SACCSA Phase III Project. Likewise, result of the follow-up of this conclusion and the replies from several States received by the Regional ICAO NACC/SAM Offices and ICAO Technical Cooperation Bureau (TCB), as well as result of the outcomes of the RLA/03/902 RCC/E Meeting, held in Costa Rica, on 24 April 2009, currently the Project members are: Bolivia, Colombia, Costa Rica, Guatemala, Panamá, Venezuela, Spain and COCESNA. Similarly, three other States have expressed their decision to join the RLA/03/902 Project, and other States have informed their particular interest in following-up the Project results.

2. RLA/03/902 Project's reasons for the study of a SBAS Solution

2.1 The SBAS SARPs an ICAO Annex 10, Volume I, indicate that a SBAS in combination with core satellite constellation(s) can support departure, en-route, terminal and approach operations including Category I precision approach. The level of performance that can be achieved depends upon the infrastructure incorporated into SBAS and the ionospheric conditions in the geographic area of interest. The SBAS systems constitute a GNSS augmentation that can improve its benefits in wide geographical areas such as the CAR/SAM regions.

2.2 The principal advantages that SBAS systems provide are listed in the following order: integrity, availability and continuity. This means that the signal and data from a SBAS is a guaranteed and reliable signal, also having the necessary elements to warn the user if a decrease in system's provisions occur that doesn't permit a determined operation to be made. This signal robustness and guarantee, allows safety-of-life operations (SoL), as well as the design of applications as indicated in the SARPs in which the service guarantee and the information integrity are core elements, including the responsibility of legal nature that could come from the provision of a regulated signal.

2.3 In the aviation sector, the SBAS systems allow the establishment and assurance of the protection limits for precision approach, allowing LPV 200 operations, including that the pilot will see the corresponding warning flags activated in case the necessary provisions are not reached.

2.4 The SBAS also permits to extend the benefits of the use of GNSS to multiple users' applications, in which the data security and the service warranty is important, such as: the transport of dangerous goods, shipping, oil companies and other applications.

2.5 The SBAS monitor wide areas and allows the use of this monitoring to avoid undesired effects on local navigation and positioning elements. The SBAS is also a supplement to other augmentations such as the GBAS or the aircraft-based augmentation system (ABAS), being the distant field monitor for ionosphere perturbations and allowing the users and air traffic control to take adequate measures before they occur. All this, makes it highly desirable to have this system; therefore several regions have implemented, or are implementing their respective SBAS; for example: the **WAAS** system in the United States expanded into Canada and Mexico, in Europe the **EGNOS**; the **MSAS** in Japan and the **GAGAN** for India is under development. Also, SBAS studies are under way in China and Africa. Australia is studying to implement the SBAS since its GRAS programme has been cancelled. In the CAR/SAM regions Project RLA/03/902 is studying the feasibility of implementing SBAS-SACCSA. Based on this growing global trend towards the implementation of the SBAS and taking into account its interoperability, new aircraft are being equipped with SBAS-GNSS receivers

2.6 In the CAR/SAM regions there are many airports that have low density operations and must meet the category I requirement in their final approach and landing operations. Given this situation according to the estimates of cost-effectiveness, the SBAS solution could be the most beneficial alternative although at airports with a large number of operations the GBAS implementation is also justified. For this reason, the use of the SBAS could be an excellent alternative augmentation for all airports and heliports, with the flexibility of having common procedures without the need for ground navaids equipment.

Overview of RLA/03/902 Project Phase III

2.7 With Project RLA/03/902 – *SACCSA* Phase II results, based on defined and developed models, it was possible to summarize that tentatively the SBAS SACCSA augmentation solution in the CAR/SAM regions was viable. The third Phase (Phase III) of the RLA/03/902 Project - *Augmentation Solution for the Caribbean, Central and South America (SACCSA)* aims to conclude phase II studies and perform functional demonstrations of prototype algorithms over the designed SBAS for these regions to determine the feasibility of the implementation of its own SBAS, confirming the technical-financial feasibility of the SACCSA project. With these results, it is intended to provide a solid basis for decision making by the States of the CAR/SAM Regions that meets the needs of users, States and International Organizations through the expansion of the use of satellite navigation.

2.8 The RLA/03/902 Project RCC/E Meeting confirmed to execute Phase III in two parts (Phase III-A and Phase III-B) as summarized in the **Appendix** to this paper. Also, it was agreed the launch of Phase III-A scheduled activities; which are being organized in an open international tender process in accordance with procedures established by ICAO and applied by its Technical Cooperation Bureau.

2.9 Based on the analysis of the Phase III programme, the main reasons for the need to implement these activities are summarized as follows:

a) the results of Phase III of SACCSA may provide the technical - financial elements sufficiently supported for decision making by States and the international organizations of the CAR/SAM regions with regard to the viability of the implementation of its own SBAS;

b) the proposed ionosphere studies are relevant for the knowledge and characterization of its actual behavior, and therefore, to determine capability for predicting the correction and its integrity, which makes it possible to confirm whether or not the regional SBAS augmentation solution is technically and financially viable.

c) the project includes an important component on training and development of human resources in the field of satellite navigation, which is extremely useful for States, Territories and international organizations;

d) the results of the project will also contribute to improve and modernize the infrastructure of air navigation in these regions to achieve the goal of performance based navigation (PBN), optimizing the structure of the airspace in accordance with the Global Air Navigation Plan and the Regional Plan;

e) the incorporation and participation of more States, Territories and international organizations in the RLA/03/902 - SACCSA Project Phase III contributes to achieve the efficient completion and use of the benefits of the project, thereby contributing to the development of the GNSS Regional implementation roadmap including their systems of augmentation; and

f) the multiplication of efforts through the coordination, cooperation and international integration of all sectors of the States and the international organizations of these regions that require more advanced GNSS services and higher quality to continue the implementation of studies and demonstrations scheduled by project RLA/03/902, will provide these regions increased benefits in safety, efficiency, capacity and continuity of operations. As part of these efforts, the Project fosters the publishing and sharing of results and experiences, training, as well as share resources, infrastructure and available knowledge.

2.10 The annual fee of membership for each State/Territory/international organization which was agreed by the RCC/E meeting for the RLA/03/902 Project Phase III-A is $ 25,000 USD.

3. Suggested actions

3.1 Considering the benefits of advancing in GNSS implementation to achieve a robust regional air navigation infrastructure that enables the introduction and effective evolution of the regional PBN plan that contributes to the capacity of accurate and reliable regional and global positioning without perceptible limits, as well as to obtain its multiple benefits, it is proposed the meeting:

a) take note of the information provided in this working paper; and

b) Urge the participation of the Central Caribbean States and Territories in the Regional RLA/03/902 Project – Augmentation Solution for the Caribbean, Central and South America (SACCSA), taking into account the considerations and information summarized in paragraphs 2.1 to 2.10 of this paper.

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APPENDIX

RLA/03/902 – SACCSA PROJECT PHASE III SCHEDULED ACTIVITIES
PHASE III-A: o Monitoring and control network, o Further completion in system definition o SACCSA UCP Prototype and its operation o Definition of support activities for system validation and certification o Analyze other complementary options in areas of poor or limited provisions o SACCSA WEB Page o Institutional aspects o Courses, Seminars and Workshops
PHASE III-B: o Cost / benefit study o Financing Study o Courses, Seminars and Workshops

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