



PROJECT RLA/03/902

**Transition to GNSS in the CAR/SAM
Regions – Augmentation Solution for the
Caribbean, Central and South America
(SACCSA)**

BULLETIN N° 4 – May 2013

1. INTRODUCTION

Since the issuance of Bulletin N° 3 in December 2010, SACCSA has made progress in the technical and operational feasibility analysis of the implementation of an SBAS system in the CAR/SAM Regions.

Following demonstrations made at the Seventh Meeting of the Coordination Committee (RCC 7 – held in San Carlos de Bariloche, Argentina, on 11-15 October 2010), the works under contract have continued to be executed, based on available funds, including continued studies and demos, and the delivery of a platform that will show, in real time, the services to be provided by the SACCSA system. This platform is available on the network.

The results of the work done were presented at the Eighth Meeting of the Coordination Committee (RCC 8 – held at the ICAO NACC Regional Office, Mexico City, Mexico, on 28-31 May 2012). The final report of the RCC/8 meeting is posted on the ICAO NACC Regional Office website: <http://www.mexico.icao.int/Meetings/SACCSA2012.html>

2. WORK COMPLETED AND PRESENTED AT THE EIGHTH MEETING OF THE COORDINATION COMMITTEE (RCC 8)

PT 1200 – Implementation of the monitoring network

PT 2100 - Technical analysis of the SACCSA SBAS solution

PT 2210 – Detailed ionosphere analysis - SACCSA

PT 2220 – Ionosphere scenarios

PT 2400 – Optimisation of the communication network

PT 2800 – SACCSA interoperability analysis

PT 3100 – SACCSA UCP prototype

PT 5100 – Identification of poor or limited service areas and supplementary solutions

PT 6200 and 6300 – SACCSA website

Studies to verify this work are to be conducted in 2013, taking into account the ionosphere storms expected for this year (especially in spring/fall). This will be crucial to confirm the proper operation of SACCSA developments and the level of service to be obtained and provided in the various areas of the CAR/SAM Regions. The work done includes the definition of the ground network topology, as shown in Figure 1, which includes the stations of Sta. Cruz de la Sierra in Bolivia and Mahaica in Guyana, which were added in the most recent studies to ensure system viability. The two control

stations are also shown in blue. This topology, which has no more than 48 stations, fulfils the horizontal and vertical precision requirement for APV-I and provides minimum confidence levels of 95% for all the service area, according to studies conducted to date.



Figure 1: Ground network topology

Source: GMV PT report No. 2100, Technical analysis of the SACCSA SBAS solution

3. GNSS SEMINAR WORKSHOP

After the RCC 8 meeting, a seminar workshop was held to show the progress achieved in SACCSA, participation options, and multimodal system applications.

It was presented during the seminar the following topics:

1. A review of SACCSA history
2. GNSS-related issues in the CAR/SAM Regions
3. The SACCSA model.
4. Sectoral multimodal application approach.
5. Test bed and users/applications.
6. SACCSA demonstration proposal with a real signal-in-space (SIS).
7. Options for participating in the SACCSA project.

8. Service marketing and business model.

9. Multimodal applications in Argentina

10. Round table.

The history of the SACCSA project was reviewed, from its inception to this date, starting with a brief history of satellite navigation and its augmentations. Subsequently, the SACCSA model was presented with its various components and the functionality of each of them, as well as the difference with other SBAS systems already in existence or under development.

One of the main topics of the seminar workshop referred to the multimodal use of SACCSA, taking into account that the aeronautical sector is very small compared to the many applications that can benefit from its integrated and high-precision services. Figure 2 below summarises the main beneficiaries of the implementation and use of the system:

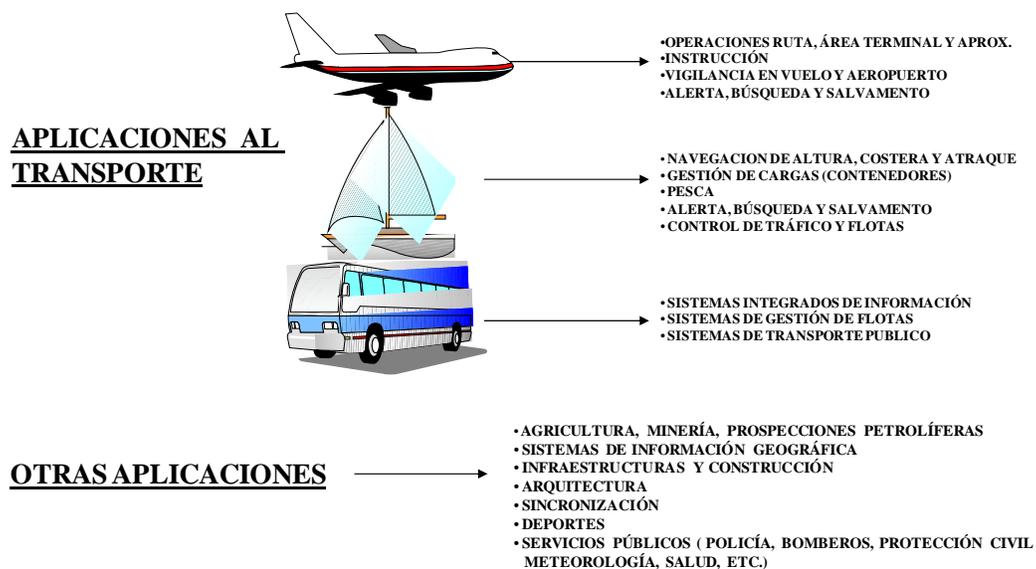


Figure 2

Subsequently, a presentation was made of the possible implementation of a test bed to obtain early benefits from SACCSA based on open, non safety-of life services, while permitting the aeronautical sector to design new procedures and prepare for the moment when an operational and certified system is deployed. As to other sectors, they could start developing applications and services based on that test bed. The objectives could be summarised as follows:

- Encourage the use of SBAS technologies in the CAR/SAM Regions, both in aviation and at a multimodal level.
- Start deriving benefits from the SBAS.

- Implement a test bed to show the effectiveness of the ionosphere algorithm on the next solar maximum.
- Have a multi-frequency and multi-constellation platform to analyse advantages and make comparisons with different future technologies, such as multi-frequency (L1/L5) and multi-constellation.
- Take advantage of the infrastructure existing in the region to obtain added value from the augmentation technology (SBAS, PPP, GNSS, etc.)
- Provide an open, non-SoL service to multimodal, monofrequency, and bifrequency users, at different service levels.
- Provide a GPS-enhancing service.
- Maximise benefits, including multiple services:
 - Precision: equivalent to DGPS and high precision, with no need for local infrastructure
 - Integrity/reliability through Protection Levels (security, LCA certification, standardisation, etc.)

This test bed would be based on elements already developed and being used in the current phases of SACCSA. Therefore, the cost would not be very high (compared to the cost of WAAS and EGNOS), and information could be sent through a GEO satellite, the network, or GSM for non-aeronautical or maritime applications.

Three possible participation models were considered:

1. Public, based on the establishment of a public enterprise, supported by all States, responsible for the development, implementation, operation and provision of the service.
2. Public/private, where two possible schemes:
 - a. The public sector funds the system and hires a private consortium to take care of the different phases.
 - b. A “joint venture” is created with public and private capital to deal with all project phases.
3. Private, based on a grouping of private enterprises for the development, deployment, and operation of the system, and for the provision of the service. States must authorise the implementation of the ground elements in their territory, and each State may choose whether or not to use the system.

Finally, a description was made of how to market GNSS services under the LBS concept, defining the horizontal service concepts that are used for organising the various services and applications, and the vertical models, which are the services and

applications developed by each user based on individual needs, and which are based on the horizontal models.

A round table conducted following the presentations highlighted the need to convey the information presented at the seminar workshop to as many entities and potential users as possible, and to consider holding another one, of longer duration and broader content, to which as many entities and enterprises that could benefit from the use of SACCSA would be invited duly in advance.

4. STATUS OF ACTIVITIES

- a. Pursuant to Conclusion 4 of RCC8, a teleconference was held to define the activities to be contracted under Phase IIIA and IIIB. Based on the proposals received and budget availability, contracts for the activities listed in Table 1 will be prioritised:

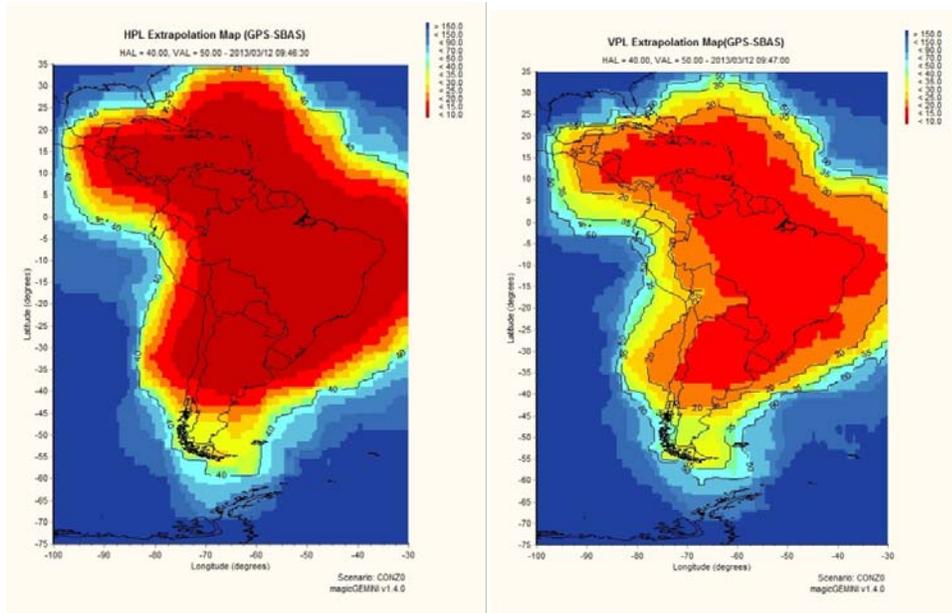
		Actividad	PT	Sub-Actividad
Tareas Fase IIIA Priorizadas		Red de monitorización y control de la misma	1300	Operación de la Red de Monitorización
		Profundización en la Definición del Sistema	2500	Comportamiento de la UCP con Datos
		Prototipo de la UCP de SACCSA y su operación	3200	Operación del Prototipo de la UCP
		Análisis de opciones complementarias en zonas de prestaciones pobres o limitadas	5200	Aprovisionamiento Herramienta de Simulación
			5300	Comparar soluciones en Zonas con Prestaciones Pobres
		Mejoras a la Página WEB de SACCSA	6300	Operación y Mantenimiento del Portal WEB

Table 1

- b. Based on the results of the arrangements cited in sub-paragraph a above, the Ninth Meeting of the Project Coordination Committee (RCC9) is scheduled to be held in July 2013.
- c. According to Conclusion 6 of RCC8, COCESNA will be responsible for coordinating the Project at regional level, as a contribution in kind.

5. OTHER GNSS ACTIVITIES

- a. As part of its research and development for demonstrating its “magicSBAS” tool, the contractor GMV launched in July 2012 a real-time demonstration platform for the SACCSA system, making use of reference stations already installed for other purposes (universities, geographical institutes, etc.). Accordingly, its continuous operation cannot be guaranteed. This platform is available at: <http://magicgnss.gmv.com/sam/> and shows the basic solution of a SACCSA test bed and the services provided by the system in compliance with air navigation requirements, in function of the availability of reference stations, as illustrated in figures 3 and 4.



Source: <http://magicgnss.gmv.com/sam/>

- b. GMV wrote an article at ICAO magazine, explaining SACCSA Project. This article is available in the next link
http://www.icao.int/publications/journalsreports/2012/6703_en.pdf
- c. One of the objectives of the SACCSA Project is to provide States with elements of judgment to support GNSS implementation, supplemented with other regional plans. Accordingly, the Workshop on PBN Airspace Design and GNSS Implementation for the NAM/CAR Regions, held in the ICAO Mexico Office on 27-30 August 2012, gave the United States Federal Aviation Administration the opportunity to state that, under current conditions, it was not possible to extend the WAAS (wide area augmentation system) to the CAR Region due to the ionosphere effect, as stated in the last paragraph of the meeting report, posted in:
<http://www.mexico.icao.int/Meetings/PBNGNSS2012Workshop.html>.
- d. The Twelfth Air Navigation Conference held in ICAO Headquarters in Montreal, Canada, on 19-30 November, addressed GNSS implementation issues, and produced Recommendations 6/5 to 6/9 on augmentation and ionosphere information systems, amongst other topics. In this regard, SACCSA results could be very useful, namely:
 - i. Recommendation 6/5, sub-paragraph a, calls for an ICAO work plan to “address the interoperability between constellations and current and future augmentation systems of global navigation satellite systems”: Work Package 2800 “SACCSA Interoperability Analysis” determined that compliance with

SARPs and MOPs ensured WAAS interoperability under complex ionosphere conditions.

- ii. In Recommendation 6/9, sub-paragraph a, ICAO is requested to “coordinate ionosphere characterisation activities at regional and global level for harmonised implementation of the global navigation satellite system”: SACCSA Work Package 2200 “Ionosphere Analysis” reviews the ionosphere scenarios used for the SBAS solution model for the CAR/SAM Regions.

- e. The report containing these recommendations may be found in: <http://www.icao.int/Meetings/anconf12/Draft%20Reports/ANConfWP161.6.SP.PDF>