



International Civil Aviation Organization

CAR/SAM REGIONAL PLANNING IMPLEMENTATION GROUP (GREPECAS)

**Fifth Meeting of the CNS Committee of the GREPECAS ATM/CNS Subgroup
(CNS/COMM/5)**

Lima, Peru, 13 to 17 November 2006

CNS/COMM/5-WP/10

31/10/06

Agenda Item 2: Navigation systems developments

2.1 Review of the results of the SBAS augmentation projects carried out in the CAR/SAM Regions

**STATUS OF THE SBAS AUGMENTATION SYSTEMS STUDIES ACCORDING TO THE
RLA/03/902 PROJECT**

(Presented by the Members of the RLA/03/902 Project)

<p style="text-align: center;">SUMMARY</p>
<p>This WP present information related to the Project RLA/03/902 SACCSA, preliminary analysis results and proposed network topology.</p>
<p style="text-align: center;">References:</p>
<ul style="list-style-type: none">• Report of the 4th coordination meeting of the project RLA/03/902 (Lima, Peru, 29-30 September 2006)

1. Introduction

1.1 The Project RLA/03/902, was launched as a result of the next conclusions:

1.1.1 In the meeting of the ATN/CNS/SG of March 2004, was proposed to perform the Project RLA/03/902 with the aim of:

“Development and pacification the technical, financial, operational and institutional aspects of an SBAS system for the CAR/SAM Regions”

1.1.2 The GREPECAS Conclusions 12/45 and 12/46 establish the beginning of the RLA/02/903 and invite to the States to participate in it.

1.2 From the beginning, the Project has been subscribed by COCESNA, Colombia, Cuba and Spain, and during the last RCC 4 held in Lima the 29 an 30 of September 2006, Dominican Republic and Venezuela has communicate their subscription to the Project. In the same meeting, Argentina and Chile expressed their support to the project and the initiation of the process to subscribe it.

2. SACCSA Solution

2.1 SACCSA appears as response to the conclusions of GREPECAS tackling in his exposition technical, financial, institutional and organizational aspects with what it includes in the only project all the aspects that influence the same one.

2.2 For it, it tries to complement each other and give new ideas and expositions along with other projects realized in the regions CAR/SAM, but with a perspective of system definition, that is to say, industrialist and the R+D.

2.3 For it, solutions will be analyzed for the resolution or mitigation of problems from a technical and system point of view. For example, the ionosphere, on the base of scientific / academic studies, will be a question of solving with the development of algorithms of mitigation, extrapolation and reduction of not desired effects, complemented with operational concepts at system and user level.

2.4 As for the reference performances, APV I has been taken as reference, with a view to the new proposals of the USA on CAT I, presented in the last ANP.

3. SACCSA Description

3.1 SACCSA has been structured around 12 WPs:

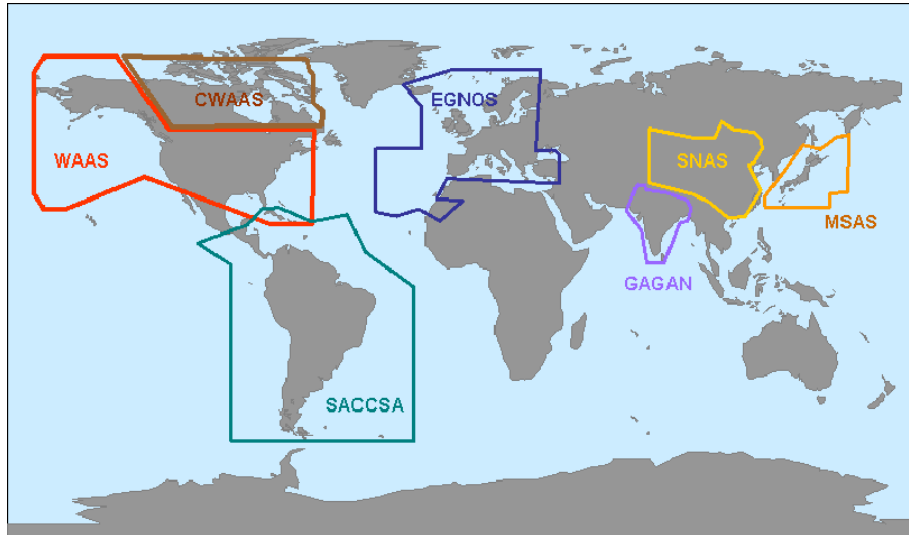
1. Collect information from the services providers and users.
2. Define system requirements.
3. Study of the independent SBAS solution
4. Ionosphere model analysis
5. Independent SBAS Specifications.
6. SBAS model MSAS specifications (if budget available)
7. Considerations on management / operation / exploitation.
8. Human resources and capacitating.
9. Economic and financial viability.
10. Activities planning.
11. Industrial position analysis.
12. Seminars

3.2 Thus WPs will cover the different aspects that must be taken into account when a project of these characteristics tries to be tackled, and try to establish the bases concerning which the requirements and models can be defined to launch a development and implementation program of an SBAS in the CAR/SAM Regions.

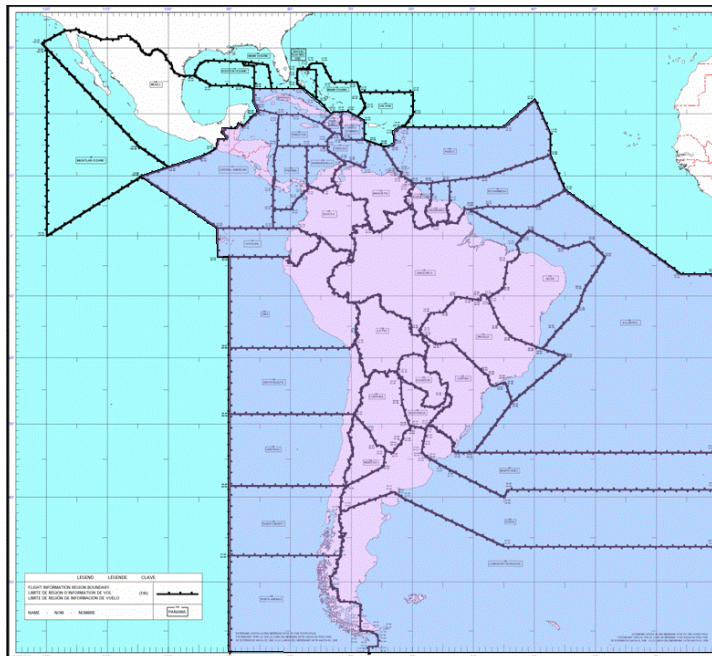
3.3 The SACCSA calendar establishes a total duration of 18 months, 6 has been dedicated to structure and organize the project and 12 to develop it. February 2007 is the initial date to finalize it.

3.4 After its finalization, a seminar will be held to present the results, conclusions and actions.

3.5 Once the first analysis had been done, the service area has been defined and consequently, the SACCSA position in a global context. In the sense, and according to the interoperability between systems, SACCSA would remain located of the following way:



3.6 In reference to the service area, comprising both the oceanic area with a ranging improvement and the continental one with performance improvement, it will be:



3.7 The system architecture will be the one used for any SBAS system, being configured in the next way:



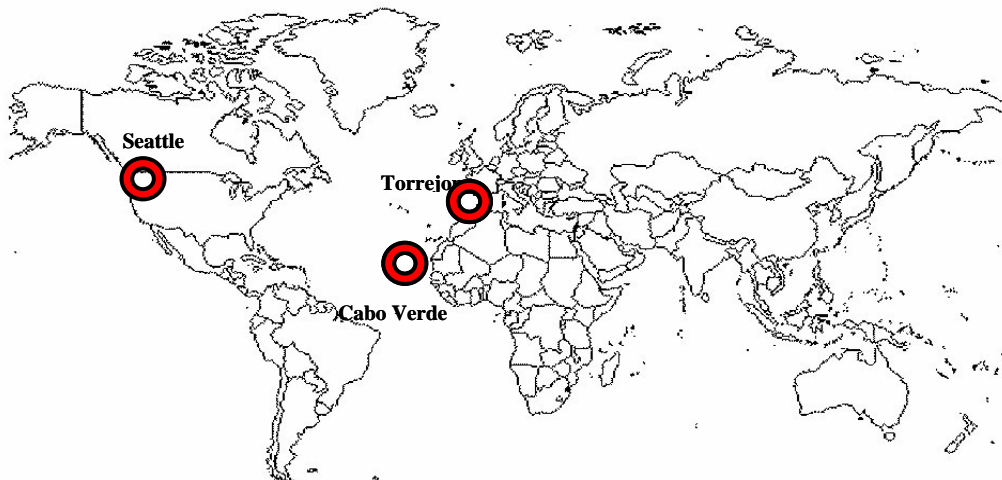
4. Reference system stations topology

4.1 The indicated topology is referred to the *Estaciones de Referencia SACCSA (ERS)*, not being considered the “*Estaciones de Acceso al Satélite (EAS)*” neither the *Centros de Proceso y Control SACCSA (CPCS)*. The total number of ERS will be of 48, distributed in two blocks:

- This first block of 45 ERS is localize inside of the coverage area (continental and some islands), and it is devoted to system parameters computation.



- The second block of 3 ERS localize outside of the coverage area, which will be devoted to distant orbitography.



4.2 In reference to the GEOs satellites, three ones have been selected in the area with type positions, in order to perform the simulations. The proposal are on optimum orbital positions and well known, but once the system is going to be implemented, thus position will be different, due to will be necessary to look for GEOs satellites equipped with navigations payload, and the tree satellites referred in the simulations do not equip it in this moment (they have plans to equip it in the future with the nest launches).



5. Performances

5.1 The indicated performances, are based on the used of POLARIS tool. Are based on the indicated topology that has been considered as the definitive one.

5.2 The ionosphere models used in these simulations are nominal and planners, and the equatorial perturbations are not applied.

5.3 That means a first approach to adjust the topology, in order to, in a next step, to perform an in-depth analysis with a ionosphere adjusted to the situation in the equatorial area, and always taking into account the ICAO SARPs.

5.4 From the first analysis, we can determine that a horizontal accuracy required for APV I, fix in 16 meters, can be achieved in the service area. In the same way, the vertical accuracy required for APV I, fix in 20 meters, can be achieved. Thus parameters will be achieved in the continental service area.

5.5 In general terms, the results are achieved with 95 % and 99% of confidence levels in accuracy aspects, and are improved according we are approaching to the service area.

5.6 Based on the GPS satellites alone, all the service area will have a minimum coverage of 6 satellites in view with a confidence level of 95%. Maintaining this level of confidence, in the equatorial areas will be 8, while in the south of the continent the results are of 6.

5.7 Pending on the analysis with adjusted ionospheres models, we can determine that the implementation of a SBAS system in the CAR/SAM Regions, with APV I performances, is feasible and technically possible.

5.8 Combining SACCSA with WAAS, will allow having a constant and uniform navigations system in the entire America continent, with similar performances and equivalent safety level, being necessary the consensus of all States and the will of them for the development and implantation of the SBAS in the CAR/SAM regions.

6. Conclusions

6.1 To invite all the participants to take into consideration this WP

6.2 An SBAS solution, with APV I performances, for the CAR/SAM Regions is feasible.

6.3 Any solution proposed for the Regions, must be oriented to achieve at least APV I for LPV operations, due to NPA solutions can be obtained with GPS standalone and/or with the support of RAIM and baro VNAV, not being necessary to implement SBAS elements to achieve such NPA performances.

6.4 The implementation can be tackled in phases, starting from a defined region, which can be used like a test area, and spreading gradually to the rest of the CAR/SAM regions.

6.5 All the States are invited to subscribe the Project RAL/03/902 SACCSA, in order to participate and to have the information and knowledge developed in the same one.

6.6 It is necessary to announce the project to other potential, not aeronautical users, to be able to see his needs and if SACCSA gives response to these needs.