International Civil Aviation Organization
Project RLA/03/902 – "Transition to GNSS/SBAS in the CAR/SAM Regions – SACCSA"
Tenth Coordination Committee Meeting (RCC/10)
Bogota, Colombia, 9 to 13 February 2015

Item 2: Report on the Transfer of Technical Coordination of Project RLA/03/902

REPORT ON THE TRANSFER OF TECHNICAL COORDINATION FROM AENA TO AEROCIVIL (COLOMBIA)

(Presented by Aerocivil Colombia)

SUMMARY	
This information paper presents an executive summary of the activities carried out for the transfer of the technical coordination of Project RLA/03/902 GNSS/SBAS – SACCSA from AENA to the civil aviation authority of Colombia, which took place in Madrid – Spain on 19-23 May 2014.	
References: • Report of the Ninth Meeting of the Coordination Committee of Regional Project RLA/03/902 (Lima, Peru, 1-4 July 2013)	
Strategic Objectives	*This paper is related to the following strategic objectives:* *A. Safety* *B. Environmental protection and sustainable development of air transport*

1. Background

1.1 At the RCC-9 meeting, held in Lima on 1 to 4 July 2013, the participating States agreed to transfer Technical Coordination functions to the Colombian Authority UAEAC at a meeting among AENA, UAEAC, and GMV (main Project contractor), at which AENA would hand over all the documentation and work methodology.

1.2 The objective of Project RLA/03/902 is to provide the technical, financial, operational, and institutional studies related to the implementation of the Satellite-Based Augmentation System (SBAS) for the CAR/SAM Regions.

1.3 Based on trials conducted in the CAR/SAM Regions concerning the WAAS (Wide Area Augmentation System) and EGNOS (European Geostationary Navigation Overlay Service), it was concluded that use of these systems could not be extended because of the particular behaviour of the ionosphere in these regions. Consequently, it was suggested that an SBAS system called "Augmentation Solution for the Caribbean, Central and South America" – SACCSA be developed with algorithms adapted to CAR/SAM needs.

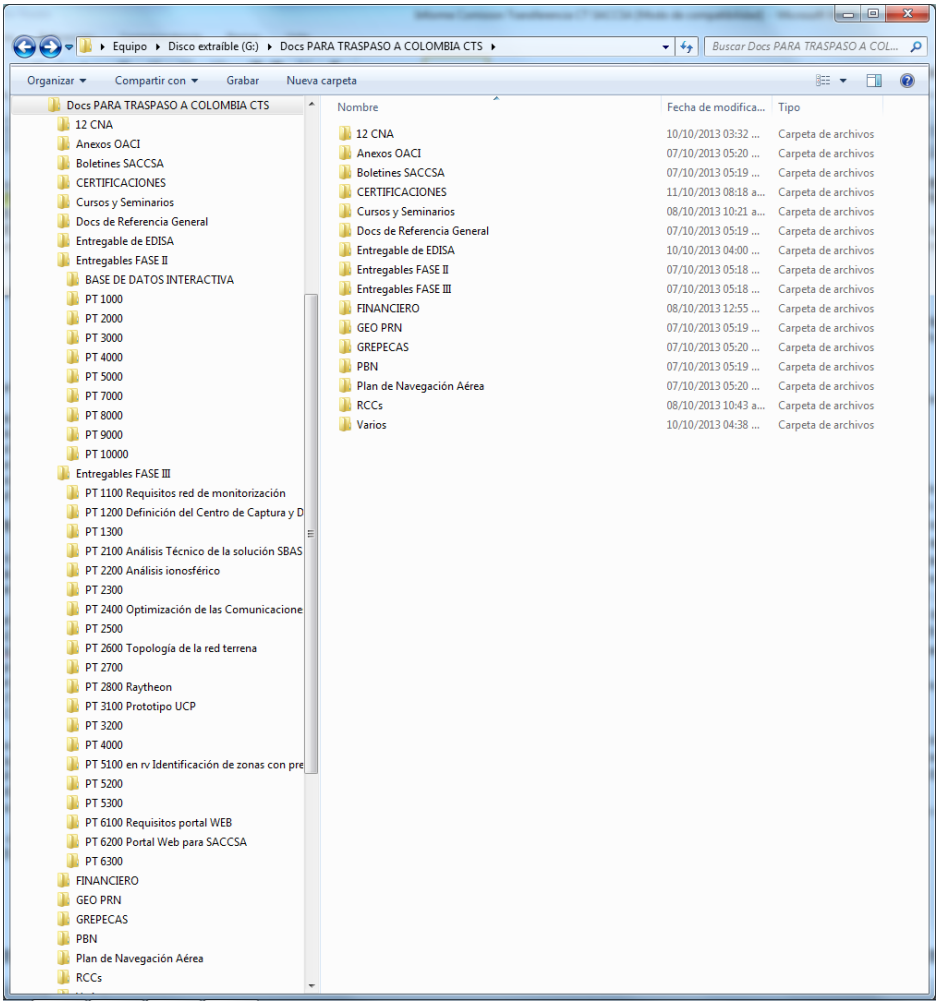
1.4 Through the ICAO Technical Cooperation Bureau, Project RLA/03/902 was launched with the participation of some CAR/SAM member States, and AENA (*Aeropuertos Españoles y Navegación Aérea*) as contributor and Technical Coordinator. This project was executed in three phases, which have demonstrated its technical feasibility.

2. AGENDA AND CONDUCTION OF THE MEETING FOR THE TRANSFER OF TECHNICAL COORDINATION OF PROJECT RLA/03/902 – SACCSA TO UAEAC

2.1 The following agenda was submitted and approved for the transfer of Technical Coordination of project SACCSA. The activities carried out are described under each item.

Day 1:

2.2 AENA handed over project information in digital format, which is to be reviewed at this meeting. The following graph shows the contents of the information received.



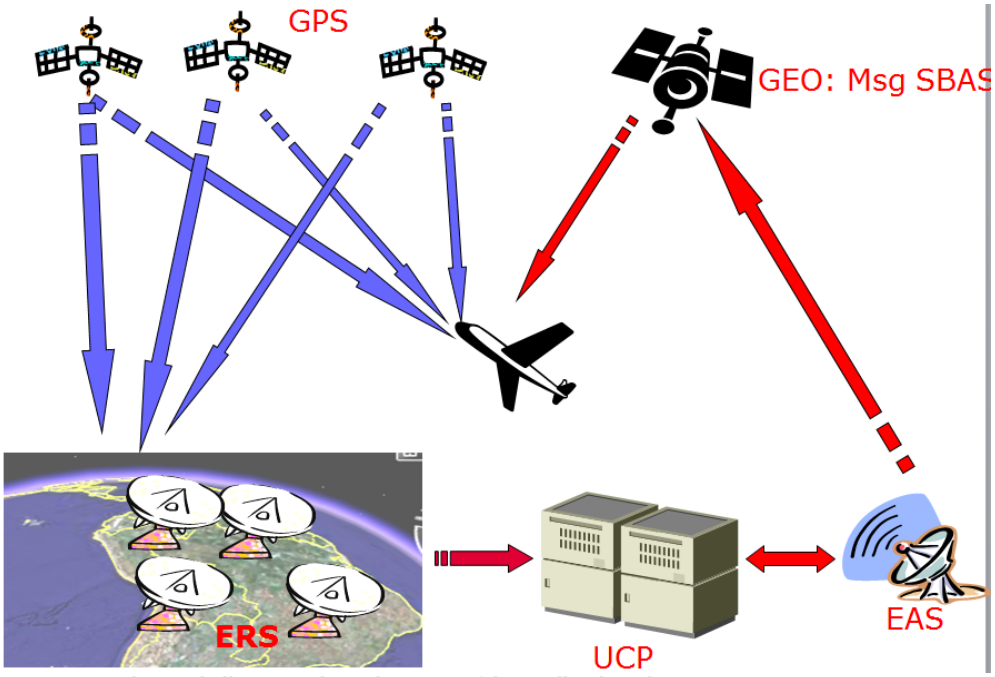
2.3 AENA presented the various phases of the Project:

- EDISA

- PHASE II
- PHASE III

2.4 It also presented the project timeline, starting with EGNOS demonstrations in the CAR/SAM Regions (EDISA), which permitted the creation of the project to define an ionosphere algorithm model to be applied in the region, given its location in the equatorial zone.

2.5 In phase II, technical studies were conducted to demonstrate the feasibility of the project, together with pre-cost/benefit studies, based on which project member States agreed to implement phase III, involving actual performance demonstrations and the presentation of a system implementation design. In 2010, the SACCSA signal was transmitted using a geostationary satellite, thus technically showing its performance.



The graph illustrates the architecture of the satellite-based augmentation system

Review of ICAO activities and resolutions within the framework of GREPECAS and its Subgroups

2.6 The information handed over by the technical coordination includes documents, information and working papers covering the period between GREPECAS/12 and GREPECAS/16, and the GNSS and CNS/ATM Subgroups.

Participation of CAR/SAM States

2.7 It was noted that the project started with the participation of the following States: Colombia, Cuba, Spain (represented by *Aeropuertos Españoles y Navegación Aérea* - AENA), COCESNA, in representation of Central America, and GJU, in representation of the European Union. Likewise, Argentina, Bolivia, Chile, Dominican Republic, and Venezuela participated as observers.

Day 2:

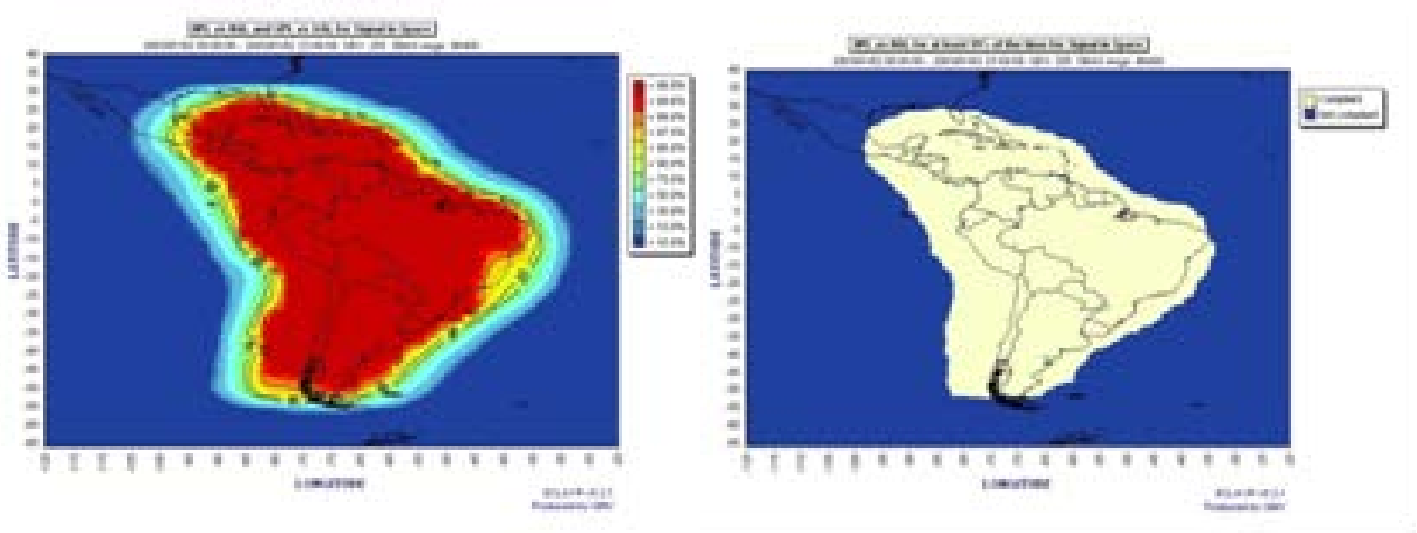
2.8 Delivery of PHASE II documentation. Description of the various deliverables.

2.9 Delivery of PHASE III documentation. Description of the various deliverables.

2.10 Documentation concerning the deliverables of work packages hired for the execution of Phases II and III was handed over. AENA briefly described the contents of each document, which provided the new technical coordinator with detailed information on the results of technical, financial, operational studies conducted to date on the future of SBAS in the CAR/SAM Regions.

2.11 Review of actions still pending for completion of PHASE III and different scenarios. Among the work packages hired under Amendment III, the following are still pending: PT 1300 Monitoring network operation, PT 6300 Website operation, maintenance, and management.

2.12 Subsequently, project status and results were described with a view to establishing the technical and operational feasibility of SBAS for APV I, after correcting ionosphere algorithms.



2.13 Likewise, to ensure project continuity, the proposal was made to implement the test bed to permit the use of the SBAS signal for the definitive commissioning of the system.

2.14 According to the final report of the RCC/9 meeting, which was held in Lima, Peru on 1-4 July 2013, a proposal was made under agenda item 6 to implement a test bed covering the following elements:

i. Navigation load in a geostationary satellite for a period of six (6) months, and 18 months without geostationary satellite
ii. Ground station for accessing the geostationary satellite
iii. Central Processing Unit
iv. Communication network (via INTERNET)
v. 8 or 9 new reference stations placed as close as possible to the sites defined in the SACCSA topology

vi. Data collection and recording centre
vii. Support centre
viii. Period of operation: 2 years (6 months with geostationary satellite, and 18 months without geostationary satellite)

2.15 Regarding the cost of the platform, the aforementioned final report of the RCC/9 meeting gave a reference value of approximately US$3.2 million. The investment would cover equipment and software, as well as recurrent costs related to the spatial segment (geostationary satellite), rental of the UCP license (magicSBAS) and operation of the associated systems.

2.16 In paragraph 6.2 under agenda item 6 of the RCC/9 final report, Colombia urged States to consider the possibility of establishing this test bed.

2.17 At the technical coordination transfer meeting, GMV gave more details about the test bed implementation proposal mentioned at the RCC/9, and suggested three scenarios:

a) CAR/SAM regional scenario: The most appropriate scenario, since it has been shown that the service provides full coverage of the CAR/SAM Regions, and thus, the implementation cost would be shared by all the States, resulting in a better cost/benefit ratio.
b) Semi-regional scenario (States concerned): An alternate scenario in which Colombia would lead the implementation of the test bed and its corresponding Central Processing Unit, and the States concerned would implement reference stations in their territories.
c) Colombian scenario: Based on the interest expressed by Colombia and following a cost/benefit analysis, Colombia would implement the test bed and demonstrate service provision to the other States so they can get involved in the implementation of the operational phase.

Day 3:

2.18 The delivered documentation included, *inter alia,* the applicable reference documents, such as ICAO Annexes, the Regional Air Navigation Plan, information on Coordination Committee meetings, courses and seminars.

Specific benefits of SBAS in the CAR/SAM Regions

2.19 A presentation was made on the benefits that would result from the implementation of an SBAS system, including:

a) Instrument approaches with vertical guidance (LPV, APV), thus enhancing air navigation safety.

b) Reduced decision height in approaches to airports where only non-precision approaches are available.
c) Improved capacity and flexibility of routes and en-route and approach procedures, with no need for local infrastructure.
d) Savings in flight time, fuel and CO2 emissions.

Multimodal Development

2.20 A presentation was made to explain that the SBAS provides benefits not only for the air navigation sector. In regions where SBAS augmentation systems have been implemented, like EGNOS in Europe, they are used by the maritime, land and railroad transportation sectors, for cargo fleet management, farming and fishing activities, for geodetic, drilling, and exploitation purposes in the mining sector, among others that benefit from the precision, availability, and integrity provided by SBAS as compared to the simple GPS.

2.21 Accordingly, it was proposed that suitable strategies and spaces be created in order to invite institutions representing the aforementioned sectors to be apprised of the benefits of the technology and become involved in its implementation.

Work methodology and responsibilities of the Technical Coordination

2.22 AENA informed about the methodology used for the reception, review, and acceptance of receivables by the contractor GMV and the respective notification to ICAO for subsequent reception and payment according to the contract.

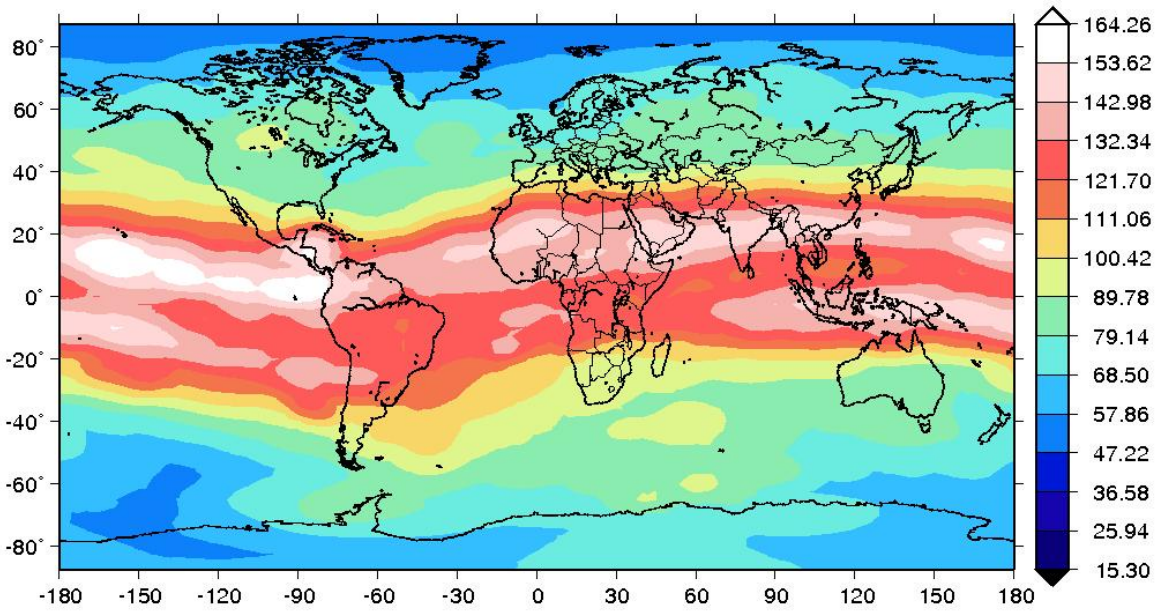
2.23 The documentation delivered included work package reception files.

Day 4:

2.24 Presentation by GMV: Joaquín Cosmen, Advisor to the Director General of GMV, made a general presentation of the company, and referred to the history of the company, its presence in various countries, including Colombia, its highly trained personnel, and satellite developments with ESA and NASA.

2.25 GNSS applications and developments: Juan Ramón Martin of GMV made a presentation of GNSS-related work. The company has participated in the development and implementation of the EGNOS system (SBAS for Europe), and has also conducted consultancy work for AENA to study the feasibility of implementing GBAS at some airports in Spain.

2.26 Studies conducted in the ionosphere for the equatorial zone: Since the start-up of the SACCSA project, GMV has been conducting studies on the behaviour of the ionosphere in the equatorial region, obtaining information from reference stations, such as the SIRGAS network, and other independent stations, such as the INGEOMINAS station network in Colombia. This has permitted the generation of the ionosphere model for the correction algorithm, resulting in SBAS services for APV I in the CAR/SAM Regions.



The graph shows the ionosphere behaviour model

2.27 TEST-BED: The proposal was made to implement the SACCSA test bed, taking into account the following:

- Implementation of test bed infrastructure (reference stations, UCP, and optional GEO broadcast for a period of time during testing)
- The equipment used in the test bed can be reused in a future operational system
- Cost/benefit analysis
- Demonstrations and multimodal trials (including aviation)
- Project for defining procedures
- Training programme
- Awareness raising in the region through workshops, congresses, demonstrations, publications, etc.
- Coordination with different entities at international level
- Test bed implementation cost

Scenario A: No GEO broadcast
Details: No GEO broadcast. One station in Colombia. Colombia covers engineering cost. 18 months of magicLPV operation.
- Cost for Colombia: 1'547,450 USD
- Cost for the rest of States: 437,140 USD
- Total: 1'984,590 USD

Scenario B: GEO broadcast (6 months) by the rest of SACCSA States.
Details: GEO broadcast for 6 months by the rest of States. One station in Colombia. Colombia covers engineering cost. 18 months of magicLPV operation.
- Cost for Colombia: 1'560,450 USD
- Cost for the rest of States: 1'720,160 USD
- Total: 3'280,610 USD

Scenario C: GEO broadcast for 3 months under the responsibility of Colombia.
Details: GEO broadcast for 3 months under the responsibility of Colombia. One station in Colombia. Colombia covers engineering cost. 18 months of magicLPV operation.
- Cost for Colombia: 2'593,480 USD
- Cost for the rest of States: 437,140 USD
- Total: 3'030,610 USD

2.28 MAGIC SBAS real-time simulation platform: A visit was made to the Magic SBAS demonstration room, where the participants saw in real time the services provided in the CAR/SAM Regions.

Day 5:

2.29 Delivery of work packages hired under Amendment III: GMV noted that Amendment No 3 to Project RLA/03/902 had already been signed and validated. The work packages hired under this amendment are being executed and will be delivered to the Technical Coordination on 23 June 2014. The work packages delivered to date are: PT 3200 Operation of the UCP prototype, PT 5200 Provision of POLARIS LITE simulation tools, and PT 5300 Comparison of supplementary solutions in areas with poor or limited service.

2.30 Preparation for RCC10: The Technical Coordination will be responsible for organising the Coordination Committee Meeting RCC10 to present to member States the results of work packages under Amendment III. The meeting proposed to include a seminar on SACCSA, inviting sectors interested in the multimodal nature of the system.

3. CONCLUSIONS

3.1 AENA officially transferred the Technical Coordination of Project RLA/03/902 to UAEAC. The documentation handed over at this meeting is kept at the UAEAC Telecommunications Bureau *(Dirección de Telecomunicaciones de la UAEAC)* and will be sent in digital format to ICAO and to each member of the Project.

3.2 The Technical Coordinator of the project will have the following tasks:

a) Review the documents handed over by AENA in order to become familiar with project information and be able to make decisions
b) Receive from GMV the work packages hired under Amendment III, conduct the corresponding study and approve them.
c) Coordinate the holding of Coordination Committee Meeting RCC/10

3.3 The transfer of the technical coordination of the SACCSA Project is of great significance for the entity and for the country, since it permits active participation in decision-making and implementation of GNSS systems with satellite-based augmentation, awareness of information, studies and other related documents collected during the project, and knowledge and use of SBAS technology in order to be on the leading edge.

3.4 Other sectors that could benefit from SBAS implementation were identified: (land, maritime, and riverine) transport, mass public transport, mining, precision farming, and fishing.

3.5 The documents handed over by AENA to the Technical Coordination (*Aeronáutica Civil de Colombia*) are considered satisfactory.

4. Suggested action

4.1 Member States/Organisations are invited to take note of this report, which is accompanied by all the information received from AENA, and it is recommended that it be posted on the SACCSA website for dissemination.

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