International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)
First Meeting of the Communications, Navigation and Surveillance/ Air Traffic Management Subgroup (CNS/ATM/SG/1)
(Lima, Peru, 15 to 19 March 2010)

Agenda Item 2: Review of global and CAR/SAM CNS/ATM developments

FOLLOW-UP, COORDINATION AND CO-OPERATION REGARDING PHASE III OF THE RLA/03/902 – SACCSA PROJECT LINKED TO THE GNSS REGIONAL IMPLEMENTATION

(Note introduced by the Project Coordinator, TCB - ICAO)

SUMMARY

Taking into account that the Project RLA/03/902 – SACCSA, Phase III implementation s considerably complex and, at the same time, has great importance towards the GNSS regional implementation, this detailed note suggests taking certain actions to achieve successful management and international coordination with GREPECAS support and the follow-up , co-operation and participation of the States and international organizations.

References:

- Bulletin Nº 1 – Dec. 2009 RLA/03/902 Project
- RLA/03/902 – SACCSA Prodoc, Phase III
- Call for tenders ST 22500566
- Evaluation report of the TCB-ICAO Evaluation Committee

1. Introduction

1.1 GREPECAS by its Conclusion 15/43 – *Supporting the RLA/03/902 – SACCSA Project*; noted the Phase III of SACCSA Project. In addition, as a result of this conclusion along with responses of some Statess received by ICAO NACC and SAM regional offices, and ICAO TCB, and as a result of the RCC/E Meeting for the RLA/03/901 Project, held in Costa Rica on April 24th, 2009, the current members of the Project are the following: Argentina, Bolivia, Colombia, Costa Rica, Spain, Guatemala, Panama, Venezuela and COCESNA. The East Caribbean countries, based on Conclusión 22/9 reached on the 22nd Meeting of Executive Directors of Civil Aviation of the East Caribbean, acknowledged the importance of this Project and are analyzing the possibility of taking action by participating in it. In the same regard, other States have showed interest and expressed their intention to join to the RLA/03/902 Project.

1.2 The third phase of the RLA/03/902 Project is considerably complex, including technical, programmatic and contractual aspects, which requires defining a management framework that ensures an appropriate handling of all associated aspects in the normal Project development.

1.3 With the objective to guarantee effective implementation and achievement of expected results regarding work tasks of Phase III in the RLA/03/902 – SACCSA Project, the ICAO's TCB decided to send an invitation to tender, which would allow evaluating different proposals and selecting the one that best fits technical and financial requirements.

1.4 The essential aspects of Phase III are described below. A necessary reorganization had to be applied to the Project management and it will be analyzed below along with the international tender results and other important aspects.

2. Discussion

RLA/03/902 Project's reasons for the study of a SBAS solution

2.1 SARPS about SBAS which are included in ICAO Annex 10, Volume I establish that SBAS in combination with core satellite constellation(s) can give support different operations (departure, in-route, terminal and approach) including equivalent 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 corresponding geographical area. The SBAS systems represent a GNSS augmentation that can improve its benefits in wide geographical areas suach as the CAR/SAM regions.

2.2 The SBAS' main advantages are (in this order): integrity, availability and continuity. This means that the signal and data given by a SBAS represents a reliable signal, and also has the necessary elements to warn the user if a decrease in system's provision occur that doesn't permit a determined operation to be made. This signal robustness and guarantee, allows to perform safety-of-life (SoL) operations , as well as the application design as indicated in the SARPS, in which a guarantee service and security of information are key elements, including legal liability that can derive from a regulated signal.

2.3 In the aeronautical field, the SBAS systems allow the establishment and and assurance of the protection limits for precision approach, making possible to reach appropriate service, including that the pilot will see the corresponding warning flags activated.

2.4 SBAS will also permits to extend the benefits of the use of GNSS to multiple user´s applications, in which data security and service warranty are crucial, such as transportation of dangerous goods, maritime transportation, oil companies and other applications.

2.5 SBAS can monitor wide areas and allows the use of this monitoring to avoid undesirable effects on navigation elements and localization. SBAS is also a complement to other augmentations, such as GBAS or the aircraft-based augmentation system (ABAS), representing the long distance guardian in case of ionospheric perturbations and making possible to users and air traffic controllers take appropriate measures before they actually happen. For all these reasons, it is very convenient to have this system. This is why some regions already implemented or are implementing their SBAS, for example: the **WAAS** system in United States, Canada and Mexico; in Europe the **EGNOS;** the **MSAS** in Japan and **GAGAN** is being developed for India. In addition, SBAS Studies are being performed for China and Africa. Australia is also considering implementing SBAS since its GRAS program has been cancelled. In the CAR/SAM regions, the RLA/03/902 Project tries to determine if it's feasible to implement SBAS-SACCSA. Based on the increasing global tendency to implement SBAS and taking into account its interoperability, new aircrafts are being equipped with SBAS-GNSS receivers.

2.6 CAR/SAM regions have many airports and most of them have low desnity operation and must meet the Category I requirement in their final approach and landing operations. In this situation, according to profitability estimates, SBAS solution could be the most advantageous option, although at airport with a large number of operations, the GBAS implementation could also be justified. For this reason, SBAS utilization is an excellent alternative augmentation solution for all airports and heliports, with the flexibility of having common procedures without the need for ground navaids equipment.

Overview of RLA/03/902 - Phase III Project

2.7 According to results of Phase II of the RLA/03/902 – *SACCSA* Project, based on defined and developed models, it could be inferred that the SBAS SACCSA solution is viable within the CAR/SAM regions. Phase III of the RLA/03/902 Project – *Augmentation solution for the Caribbean, Central and South America (SACCSA)* intends to conclude studies performed in Phase II and display the operational part of algorithm prototypes on the SBAS designed for these regions in order to determine profitability of SBAS implementation confirming technical-financial viability for the SACCSA Project. This will make possible a solid base for decision making by the participating countries, and the CAR/SAM regions that allows satisfying users, countries, territories and international organizations and the fulfillment of their different needs through the use of the satellite navigation.

2.8 The RCC/E meeting of the RLA/03/902 Project confirmed Phase III implementation in two parts (Phase III-A and Phase III-B) according to the summary included in the **Appendix** to this paper. In addition, there was an agreement on the launch of Phase III-A scheduled activities, with this goal, ICAO sent an invitation to GNSS specialized companies to tender (international call on August 2009), in conformity with procedures established by ICAO and applied by ICAO's TCB. As a result, a consortium was selected composed of companies from Spain, United States, Argentina and Costa Rica.

2.9 According to the program analysis of Phase III, the following is a summary of the main reasons that explain the need to implement these activities:

a) results from SACCSA Phase III may provide the necessary technical-financial evidence to participating States and international organizations to make decisions within the CAR/SAM regions regarding viability of implementing of its own SBAS;

b) proposed ionosphere studies have relevant importance in order to widen knowledge and description of real behaviour, and therefore, to determine forecast correction capacity and its integrity which allows confirming whether or not the CAR/SAM SBAS regional augmentation solution is technically and financially viable;

c) the Project includes an important component on training and development of human resources in the satellite navigation field, which is remarkably useful to participating States, Territories and international organizations;

d) project results will also contribute to improve and modernize air navigation infrastructure in these regions toa chive the goal of performance based navigation (PBN), optimizing the structure of the airspace in accordance with the Global Air Navigation Plan and the CAR/SAM regional plan;

e) participation of more States, Territories and international organizations in the Pahse III of the RLA/03/902 – SACCSA contributes to increasing international co-operation, achieving end results and taking advantage of the Project benefits, collaborating in a roadmap GNSS regional implementation, including augmentation systems; and

f) multiplication of efforts through coordination, co-operation and international integration of all sectors within participating countries and international organizations of these regions that require more advanced and higher quality GNSS services to continue performing studies and scheduled presentations by the RLA/03/902 Project and to achieve the benefits of a solid and reliable positioning capacity with imperceptible limits to attain the goal of implementing SBAS

augmentations in medium and long term. It will provide these regions an increment in benefits regarding operational security, efficiency, capacity and continuity in operations. As part of these efforts, the Project encourages exchange of results and experiences, training and sharing of resources, infrastructure and available knowledge.

2.10 The annual membership fee for each State/Territory/International Organization that was agreed on the RCC/E meeting for the Phase III-A of the RLA/03/902 Project is a total of USD $75.000 per member.

Restructuring the Project management

2.11 In order to deal with the Phase III, a work group has been created. It will be under ICAO supervision, along with AENA as coordinator of implementing technical activities, and it will include the industry (based on the tender winner), operators, users, suppliers and civil aviation administrators.

2.12 Given the complexity of the Project, its Management has been divided in the following areas: General and Administrative Management, International Coordination, Technical Coordination, and Coordination and Support to NACC and SAM Regional Offices in Mexico and Lima. A description of duties within these areas follows:

1. **General and Administrative Management.** Under responsibility of ICAO's Technical Co-operation Bureau in Montreal. Esta gestión es responsabilidad de la Dirección de Co-operación Técnica de la OACI, en Montreal. They are in charge of elaborating agreements that support the project and obtaining the corresponding signatures from international organizations and countries involved. They also gather contribution fees and manage the funds. In addition, they organize tenders and undertake responsibility of signature of contracts with the tender winner.

2. **International Coordination**. In charge of:
   a) Fostering and promoting the SACCSA Project among the countries and International Organizations within the CAR/SAM Regions.
   b) Coordinating with participating countries and international organizations to ensure the appropriate project development and circulation and analysis of the accomplished work.
   c) Dealing and negotiating with participating countries and international organizations in order to obtain more support and cooperation for the project.
   d) Promoting SACCSA advantages for non-aeronautical parties.
   e) Contacting institutions in the countries within the CAR/SAM Regions to involve non-aeronautical parties.
   f) Promoting the participation of different Ministries (Industry, Transport, Finances, etc.)
   g) Providing support to the Regional Office in Mexico and Lima along with the Technical Bureau in Montreal in the project follow-up.
   h) Coordination between the Project and NACC and SAM Regional Offices in Lima and Mexico.
   i) Preparing and managing the implementation phase along with AENA and TCB.

3. **Technical Coordination**. Luis Andrada Márquez, from AENA (Spain) is responsable for:

   a) Monitoring technical activities, in coordination with the International Coordinator, assuring the appropriate development of the project.

b) Coordinating technical activities contracted by ICAO.
c) Coordinating with SACCSA participating countries and international organizations , so that SACCSA web access can be granted. Also, if required, access and/or contact with staff in charge of developing industrial activities of the Project could be arranged, including granting authorizations to visit or contact staff if necessary.
d) Acting as a link between the contractor and ICAO, informing this institution if an irregular situation is detected.
e) Supervising the implementation of services based on SACCSA.
f) Reviewing and approving, if necessary, work performed by the contractor in different areas.
g) Organizing presentations and showing results of accomplished and/or in progress work in as many forums as ICAO designates necessary (GREPECAS, CNS/ATM, RCCs, seminars, etc.)
h) Organizing follow-up meetings with the contractor as often as necessary in order to ensure the appropriate development of on-going projects.

4. Regional Offices: The NACC and SAM Regional Offices in Mexico and Lima in conformity with their attributions assist, keep informed and encourage accredited countries and international organizations about the Project progress and evolution by inviting them to different meetings and/or seminars promoting cooperation and participation among them.

Internacional Tender Offer

2.13 Given the Project complexity and the numerous services to hire, TCB, in conformity with ICAO procedures, invited on August 2009 a list of companies to give them the opportunity to be granted the tasks to be performed in the SACCSA Project - Phase III. The following tasks were to be assigned:

- PT 1000: Network monitoring and control.
- PT 2000: Conclude studies of Phase III, closing subjects such as ionosphere, communications, network topology of reference stations and others.
- PT 3000: SACCSA UCP prototype and its operation.
- PT 4000: Definition of supporting activities to validation/certification processes in the system.
- PT 5000: Analysis of additional options in poor or limited areas.
- PT 6000: SACCSA website.

2.14 Thirteen companies were invited, and the selected consortium is the following:

- GMV (acting as main contrator) (Spain)
- INDRA (Spain)
- Raytheon (USA)
- SENASA (Spain)
- Universidad Nacional de la Plata (Argentina)
- CeNAT (Centro Nacional de Alta Tecnología de Costa Rica)*

2.15 In the proposal, the ICAO's TCB evaluating committee indicated the following (excerpted from the final evaluation report):

"The consortium accredits considerable experience in GNSS, with substantial participation in WAAS, GAGAN, MTSAT, EGNOS and GALILEO Projects, with WAAS fully operational for LPV 200. The continuation of the works done in SACCSA Phase II is

*National Centre for High Technology

guaranteed, using compatible/advanced or same tools and methodology, and defining it with an interoperability perspective, especially with WAAS, to fulfill an American continent SBAS solution (WAAS + SACCSA). Another important aspect is that the consortium includes 3 Spanish, one North American (USA), one Central American (Costa Rica) and one South American (Argentina) companies that will have a complete view of the system, and will ensure the opportunity to continue in further phases of SACCSA.

The offer is fully compliant with the request in the tender document issued by ICAO, addressing different points and requirements. It responds to all the questions, and in some cases, offers work in addition to the ones required. The price is adjusted to the requirements, and in some cases, show a clear technical interest in the project, beyond commercial issues or interest, being in line with the global market prices for these types of studies".

2.17 The winning offer includes a total amount of USD$1.390.000, with a 24-month period to implement it.

2.18 It must be highlighted the fact that the winning consortium includes two of the main actors of the European EGNOS development (GMV and INDRA), the responsible party in charge of developing WAAS and GAGAN (Raytheon), and a team in charge of performing ionospheric studies in complex areas (Raytheon, GMV and Universidad de La Plata.)

Proposal of the Conclusion Project

2.19 Having pointed out the reorganization of Project management and the implementation of work for Phase III, it is also extremely important the follow-up, cooperation and participation of countries, international organizations and GNSS users within the CAR/SAM regions and other sectors that belong to territories that require more advanced GNSS services. National, regional and global co-operation is crucial for the exchange of knowledge, experiences so that goals linked to implementing GNSS can be achieved. It's also encouraged coordination and co-operation with local GBAS projects and other initiatives to implement GNSS elements.

2.20 Taking into account the information included in this note, it is suggested to the audience to consider to review and formulate a Conclusion Project for the GREPECAS/16 meeting, as it follows:

PROJECTI OF CONCLUSION 16/XX: FOLLOW-UP, PARTICIPATION AND COOPERATION TOWARDS THE PHASE III FOR THE RLA/03/902 – SACCSA PROJECT ON THE GNSS REGIONAL IMPLEMENTATION

With the objective of concluding technical-financial viability studies of the SBAS implementation within the CAR/SAM regions; promote the GNSS regional implementation in conformity with ICAO Global Airnavigation Plan, and contribute to the regional plan of introduction and evolution of the performance based navigation (PBN), the States , international organizations and users are encouraged to:

a) follow-up, collaborate and increase active participation on Phase III of the RLA/03/902 – SACCSA Project;

b) promote co-operation between national entities dedicated to perform research and make progress on development with support of educational institutions (universities and others); so that scientific and technical support is provided. It will also contribute to spread this

knowledge in specialized staff and future users; and

c) Increase coordination and exchange of information, obtained results and experiences in this project, GBAS national projects and other initiatives regarding the GNSS implementation and the application of this system into other interested sectors in the participating States.

3. Suggested actions

3.1 The Meeting is invited to:

a) Take notes of the information provided in this paper;

b) Follow-up and take appropriate decisions to encourage the follow-up along with support and coordination of the CNS/ATM subgroup to the activities for the Phase III in the SACCSA Project; and

c) Review and conceive -taking into account the information provided throughout this document- a conclusion Project based on the suggested text (paragraph 2.20) with the purpose of promoting monitoring, cooperation and coordination with participating countries and international organizations about Phase III of the RLA/03/902 Project; so that coordination can increase in other initiatives regarding the GNSS implementation, and between state entities which would benefit from implementing GNSS elements and the use of this system.

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APPENDIX

SCHEDULED ACTIVITIES FOR THE PHASE III OF THE RLA/03/902 – SACCSA PROJECT
PHASE III-A: o Network monitoring and control o Deeper/clearer definition of the system o SACCSA UCP prototype and its operation o Definition of supporting activities for validation/certification processes in the system o Analysis of additional options in poor or limited areas o SACCSA Website o Institutional aspects o Course, seminars and workshops
PHASE III-B: o Cost / benefit analysis o Financing (study) o Course, seminars and workshops

– END –