



International Civil Aviation Organization

Second Surveillance Task Force Meeting of the CNS Committee of the Caribbean / South American Regional Planning and Implementation Group (GREPECAS) ATM/CNS Subgroup

CNS/SUR/TF-2

Lima Peru 9-10 May 2008

CNS/SUR/TF/2 IP/02

05/02/08

- Agenda Item 1** Follow-up on ADS-C, ADS-B and Multilateration Trials in the CAR/SAM Regions
- Agenda Item 2** Development of a Regional Strategy for Surveillance Implementation in the CAR/SAM Region
- Agenda Item 3** Development of an initial Plan for ADS implementation

SURVEILLANCE ASPECT IN THE GREPECAS 14 AND THE FIRST MEETING OF THE SURVEILLANCE TASK FORCE

(Presented by the secretariat)

Summary

This information paper presents information related on current surveillance aspects considered in the GREPECAS 14 and the First Meeting of Surveillance task force of the CNS Committee with the status of implementations of the conclusion formulated in this meeting.

Reference

Report of the Fourteenth Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/14 San Jose, Costa Rica, 16 – 20 April 2007)

Report of the First Meeting of Surveillance Task Force of the CNS Committee of the Caribbean / South American Regional Planning and Implementation Group (GREPECAS) ATM/CNS Subgroup (Port of Spain, Trinidad on 20-21 June 2007)

1 System Surveillance Development on the GREPECAS 14

1.1 During the last meeting of CNS Committee (Fifth CNS Committee Lima Peru 13 to 16 November 2006) in reference at the surveillance matter the following aspects were analyzed:

- 1.1.1 Follow-up to the development of surveillance systems and the regional implementation study of the SSR in Mode S
- 1.1.2 Study of the Regional ADS Systems Implementation
- 1.1.3 Updating of the Regional Surveillance Plan

1.2 All the aspects above mentioned were presented and approved by GREPECAS 15 (San Jose de Costa Rica 16-20 April 2007).

Follow-up to the development of surveillance systems and the regional implementation study of the SSR in Mode S

1.3 In reference at this aspect the meeting took note of development of multilateralism, its roles for aeronautical surveillance and its preliminary review and acceptance that would be carried out by the Aeronautical Surveillance Panel (ASP).

1.4 Additionally under this aspect the Meeting took note of consideration for ground implementation of Mode S secondary surveillance radars (SSR) and in order to assist CAR/SAM States/Territories/International Organizations in the standardization of the 24-bit address allocation to identify aircraft using Mode S transponders, that the CNS Committee incorporate a new task related to this issue within its work program.

1.5 Finally under this aspect the meeting considered to develop a general surveillance plan containing all required surveillance applications, harmonised with the Global Air Navigation Plan. **Appendix A** of this information paper contains preliminary elements for a regional consolidated strategy for the implementation of surveillance systems.

Study of the Regional ADS Systems Implementation

1.6 Under this aspect the meeting took note on the surveillance performance indicator in the Global Air Navigation Plan (Doc 9750 – AN/963), established through GPI-09 – *Situational Awareness*, which provides guidelines for the application of data link-based surveillance (ADS-C, ADS-B and SSR in Mode S).

1.7 A revision to the preliminary CAR/SAM Regional Strategy for ADS-C and ADS-B system implementation in the short, medium and long terms was made. **Appendix B** of this information paper presents the preliminary strategy that the meeting agreed it would be convenient to integrate the elements into a unified regional strategy for surveillance system implementation. The meeting also updated the potential airspaces for ADS-C and ADS-B implementation, see **Appendix C** of this information paper.

1.8 The meeting took note of the importance to execute ADS-B trials programme using available services and technology in order to improve knowledge on ADS-B and to assess the benefits for air traffic management in the CAR/SAM Regions. In this respect the meeting considered the creation of a Surveillance Task Force through the decision CNS/5/15 (**Appendix D** presents the terms of reference, work programme and composition of the Task Force).

2 First Meeting of Surveillance Task Force

2.1 The first meeting of the Surveillance Task Force took place in Port of Spain, Trinidad on 20-21 June 2007. The Agenda of the meeting considered the following items: election of the Surveillance Task Force Rapporteur, the development of a strategy for the evolution of aeronautical surveillance in the CAR/SAM Regions and other issues.

Election of the Surveillance Task Force Rapporteur

2.2 Ms. Veronica Ramdath from Trinidad and Tobago was nominated as the Rapporteur of the CNS/SUR/TF. This nomination was seconded and accepted by the Meeting.

Development of a strategy for the evolution of aeronautical surveillance in the CAR/SAM**ADS C Trial**

2.3 Under this Agenda Item the meeting took note of trials on ADS C in Brazil and plan in Trinidad & Tobago, Colombia expressed his interest in make ADS C trials , IATA offered to provide assistance to the CAR/SAM Regions and share information based on their experience with ADS-C trials carried out in a portion of the Pacific and North Atlantic and ICAO offered to set up a webpage link on the ICAO website which will contain information on the progress of the trials decided by States.

Multilateration

2.4 The meeting took note of the Wide Area Multilateration surveillance system and trials and studies were interested by Brazil, Colombia, Cuba and Trinidad & Tobago. The meeting considered that multilateration is a viable option to provide immediate surveillance coverage in geographical areas where secondary radar cannot be effectively deployed and at the same time it provides an economically effective transition to ADS-B when all aircraft are fully and correctly equipped.

2.5 The United States delegate agreed to provide information on their projects in Colorado on multilateration techniques and Juneau, Alaska on ADS-B conducted since 2001 and currently continuing.

2.6 A question of whether States would require a license for active multilateration (as opposed to passive) from their national telecommunications authority to operate multilateration due to the interrogation of the aircraft avionics was raised. This question would be answered by each State obtaining the information from their respective telecommunications authority.

2.7 The meeting took note that ICAO cautioned that separation and safety standards have not yet been established for multilateration and the process for individual States to individually carry out these types of exercises would be time consuming and costly and added that trials in this area for WAM would be costly and further advised that this should be placed in the near future for consideration trials

ADS B Trial

2.8 The meeting took note of trial of ADS B in Cuba in the Havana FIR and established that Trinidad and Tobago and the United States establish and implement ADS-B trials project in the Piarco FIR.

2.9 The meeting invites States/Territories/International Organizations from the CAR/SAM regions to participate in the Project above mentioned, expanding the trials in other airspaces and follow-up the execution and results of the projects in Cuba , Piarco FIR, as well as other initiatives.

2.10 Also the meeting took note that all States/Territories/International Organizations who conduct trials and other ADS-B related activities, inform the ICAO respective Regional Offices before 31 July 2008 on the status of implementation and results of their activities to ease the analysis and coordination through the GREPECAS CNS/SUR Task Force.

Development of a strategy for the evolution of aeronautical surveillance in the CAR/SAM Regions

2.11 The Meeting considered the necessity to elaborate a Draft Strategy for the evolution of aeronautical surveillance in the CAR/SAM Regions and decided that the most effective manner to address this issue was to delegate the responsibility to develop a strategy. The proposed strategy would be circulated and comments invited. Brazil volunteered to carry out this task.

Conclusions formulated

2.12 The meeting formulated four conclusions, one for each the aspects above mentioned (ADS C trials, Multilateration , ADS B trials and Development of a strategy for the evolution of aeronautical surveillance in the CAR/SAM Regions). The Conclusions were the followings:

CONCLUSION CNS/SUR/TF 1/1 ADS-C TRIALS IN THE CAR/SAM REGIONS

That Brazil and Trinidad and Tobago be urged to conduct ADS-C trials with the following tentative schedule:

- i. Trials in Brazil;
- ii. Trials in the Piarco FIR;
- iii. the data and other results be informed to the ICAO NACC Office to be analyzed and coordinated through the GREPECAS CNS/SUR/TF; and
- iv. present an initial report on the analysis of the trials before **31 July 2008** to enable ICAO and the GREPECAS mechanism to present the results at the GREPECAS/15 Meeting tentatively to be held in October 2008.

CONCLUSION CNS/SUR/TF 1/2 APPLICATION OF MULTILATERATION AS A SURVEILLANCE OPTION

That:

- a) States / International Organizations consider multilateration as a viable option to provide immediate surveillance coverage in geographical areas where secondary radar cannot be effectively deployed and at the same time it provides an economically effective transition to ADS-B when all aircraft are fully and correctly equipped; And
- b) Trinidad & Tobago and Brazil be urged to conduct trials in multilateration along similar guidelines used for the ADS-C trials as a transition path to ADS-B in the medium term.

CONCLUSION CNS/SUR/TF 1/3 ADS-B TRIALS

To urge,

- a) Cuba to continue its ADS-B trials in the Havana FIR;
- b) Trinidad and Tobago and the United States to establish and implement ADS-B trials project in the Piarco FIR;
- c) States/Territories/International Organizations from the CAR/SAM regions will be invited in the Project mentioned in b) above, expanding the trials in other airspaces and follow-up the execution and results of the projects mentioned in a) and b), as well as other initiatives; and
- d) all States/Territories/International Organizations who conduct trials and other ADS-B related activities, inform the ICAO NACC Office before 31 July 2008 on the status of implementation and results of their activities to ease the analysis and coordination through the GREPECAS CNS/SUR Task Force.

DECISION CNS/SUR/TF 1/4**DRAFT STRATEGY FOR THE CAR/SAM REGIONS FOR THE EVOLUTIONARY IMPLEMENTATION OF AERONAUTICAL SURVEILLANCE SYSTEMS**

That Brazil as a Member of the CNS/SUR/TF will develop a draft strategy for the CAR/SAM Regions for the evolutionary implementation of aeronautical surveillance in the CAR/SAM Regions by October 2007. The draft will be circulated via email for comments.

2.13 The meeting took that IATA will inform the aircrafts operating in the CAR/SAM Regions that counts with ADS C , ADS B and Mode S capacity.

3 Other issues

3.1 The meeting during this Agenda Item t reviewed the Task Force Work Programme and agreed that the following should be added to the tasks of the CNS/SUR/TF, coordinate the other on-going and planned ADS-B trials in the CAR/SAM Regions and collect and analyze the data from other trials in the CAR/SAM Regions.

3.2 The Meeting also took note discussed that radar sharing activities was no requirement for this task since radar sharing activities could be conducted through multilateral/bilateral agreements with interested States.

4 Actions suggested

4.1 The meeting is invited to:

- a) take note of this information paper regarding the surveillance aspects considered in GREPECAS 14 and the results of the first meeting of the Surveillance Task Force.
- b) take note of status of Conclusion of the first Surveillance Task Force Meeting presented in **Appendix E** of this Information Paper.

APPENDIX A**DRAFT ELEMENTS FOR A REGIONAL STRATEGY FOR SURVEILLANCE SYSTEMS**

- **Short term: (until 2011)**
 - **Installation of surveillance systems on ground**
 - Implementation of SSR radars Mode S only in high-traffic-density approach, en route, and terminal areas,
 - Implementation of monopulse SSR, adaptable to Mode S, in medium- and high-traffic en route and terminal areas.
 - Begin ground implementation for ADS-B (ES Mode S receivers) for en route and terminal areas not covered with radar, and strengthen surveillance in areas covered with SSR Modes A/C and S.
 - Begin the implementation of multilateration, where aircraft respond to SSR Mode A/C or SSR Mode S queries for aerodrome surface movement surveillance

Aircraft

- Assignment of *24-bit addressing for unique aircraft identification*
- Complete the implementation of ACAS II systems throughout commercial and general aviation. Use of basic Mode S transponder
- Begin the update of Mode S transponder so that it can operate in ADS-B and multilateration environments

- **Medium term: (2011 – 2015)**
 - **Installation of surveillance systems on ground**
 - Implementation of Mode S in those monopulse SSRs that have Mode S capabilities, in areas with coverage and increased air traffic.
 - SSR Mode A/C and SSR Mode S continue to be the main surveillance elements for approach, en route, and terminal areas.
 - Increase ADS-B installations on ground (ES Mode S receivers) for en route and terminal areas not covered by radar, and strengthen surveillance in areas covered by SSR Mode A/C and SSR Mode S.
 - Increase the implementation of multilateration, where aircraft respond to SSR Modes A/C and S queries for surveillance of aerodrome surface movements, and begin the implementation of surveillance applications in approach, en route and terminal areas (wide area multilateration, WAM) in areas that are not covered by radar surveillance and to strengthen radar surveillance

Aircraft

- Increase updating of Mode S transponder for ADS-B and multilateration operations

- **Long term:
(2015 - 2025)**

Installation of surveillance systems on ground

- Begin the non-replacement of SSR Mode A/C radars that have completed their life cycle.
- Implement ADS-B or multilateration systems to replace the SSRs that have completed their life cycle
- Begin the implementation of new ICAO-approved surveillance systems

Aircraft

- New updates of Mode S transponder to support new ADS-B functions, such as improved information transmission capability, more information on board to give the pilot the capability to make decisions on separation.

APPENDIX B**CAR/SAM Regional Strategy for the ADS-C and ADS-B Systems Implementation****Near-Term (until 2011)**

1. The ADS-C surveillance implementation is used in oceanic and remote airspace associated with FANS capacities. The ADS-B surveillance implementation should be prioritize in the continental airspaces where there is no radar surveillance available, taking into consideration the density of traffic, the operational requirements and aircrafts capability. Also, consideration should be given to the potentialities to complement or replace the SSR in a scarcely to medium traffic density area, for route surveillance, in terminal areas, for surface movement control (ADS-B) and other applications.
2. Each State/Territory/International Organization needs to evaluate the: maximum density traffic nowadays and expected for the year 2015. The useful life of their radars and the potentiality for their replacement with ADS-B, the locations of potential ADS-C or ADS-B ground station sites, and the capabilities of existing and planned ATC automation systems to support the ADS-C or ADS-B.
3. The proportions of equipped aircrafts are also critical for the ADS-C and ADS-B deployment, for which it is required to periodically provide, at least, the following information: number of equipped aircrafts operating in the concern airspace, number and name of the airlines that have equipped aircrafts for ADS-C and ADS-B, type of equipped aircrafts, categorization of the accuracy/integrity data available in the aircrafts.
4. The ADS-B deployment should be associated at early stages in coordination with the States/Territory/International Organizations responsible for the control of adjacent areas, and the correspondent ICAO Regional Office, establishing a plan in the potential areas of ADS-B data sharing, aimed at a coordinated, harmonious and interoperable implementation.
5. Each State/Territory/Organization should investigate and report their own Administration's policy in respect to the ADS-B data sharing with their neighbours and from cooperative goals.
6. The ADS-B data sharing plan should be based selecting centres by pairs and analyzing the benefits and formulating proposals for the ADS-B use for each pair of centre/city with the purpose to improve the surveillance capacity.
7. Likewise, it is necessary to consider implementing surveillance solutions for surface movement control by the implementation of ADS-B.
8. To support the ADS-C and ADS-B regional plan, the States/Territories/International organizations, as well as the entity representing the airspace users, should organized and provide the following information; a focal point of contact, its respective implementation plan, including a time-table, and information on its air-ground communications and automation systems.
9. The ADS-B data links technology that will be use for the Mode S 1,090 MHz extended squitter to (1090 ES). Likewise, at the end of the medium term the introduction of ADS-B data sharing could be initiated and be approved by ICAO for its use in a long-term to satisfy the new requirements of the global ATM system.
10. The implementation would be in conformity with the SARPs, ICAO guidelines and the GREPECAS conclusions.

Medium-Term (2011 – 2015)

11. Continuation of the ADS-B use with the 1090 ES technique and the planning initiation for the ADS-B implementation by new data links to satisfy the ATM global system requirements.

Longer-Term (From 2015 to 2025)

12. The planning and implementation would be carried out according to the ADS and ADS-B evolution, with the associated technology developments, in conformity with the global ATM systems, with the new SARPs and ICAO guidance.

APPENDIX C

POTENTIAL AIR SPACE TO IMPLEMENT ADS-C AND ADS-B CONSIDERED BY CAR/SAM STATES, TERRITORIES, AND INTERNATIONAL ORGANIZATIONS / ESPACIOS AÉREOS POTENCIALES PARA IMPLANTAR ADS-C Y ADS-B CONSIDERADOS POR LOS ESTADOS/ TERRITORIOS/ORGANIZACIONES INTERNACIONALES DE LAS REGIONES CAR/SAM

No.	State or Organization/ Estado u Organización/ Center/Centro	Air Space/ Espacio aéreo	ADS Type/ Tipo	Status/ Estado	ADS-B data sharing with/ Intercambio de datos ADS-B con	Impl. Date Fecha de Impl.	Remarks/ Observaciones
1	2	3	4	5	6	7	8
	CAR						
1.	Bahamas/ Nassau ACC	Nassau FIR	ADS-B	S			Studies are being carried out. /Se están realizando estudios.
2.	Cuba/ Habana ACC	Havana FIR (South East Zone)	ADS-B	S			Studies are being carried out. /Se están realizando estudios.
3.	Haiti/ Port au Prince ACC	Port au Prince FIR	ADS-B	S			Studies are being carried out. /Se están realizando estudios.
4.	Mexico/ Mérida ACC Monterrey ACC	Golf of Mexico (Central zone between Houston Oceanic and Mexico FIRs / Zona central entre las FIRS Houston Oceanic y México)	ADS-B	P	Houston ARTCC		Based on an agreement Mexico - USA/ Basado en acuerdo México - Estados Unidos.
5.	Trinidad and Tobago/ Piarco ACC	Piarco FIR	ADS-B ADS-C*	P			Studies are being carried out. /Se están realizando estudios. * Oceanic East Sector/Sector Este oceánico
6.	United States/ Houston ARTCC Miami ARTCC	Golf of Mexico (Central zone between Houston Oceanic and Mexico FIRs / Zona central entre las FIRS Houston Oceanic y México) Miami Oceanic FIR (Domestic zone)	ADS-B ADS-B	P P			Based on an agreement Mexico - USA/ Basado en acuerdo México - Estados Unidos.

No.	State or Organization/ Estado u Organización/ Center/Centro	Air Space/ Espacio aéreo	ADS Type/ Tipo	Status/ Estado	ADS-B data sharing with/ Intercambio de datos ADS-B con	Impl. Date Fecha de Impl.	Remarks/ Observaciones
1	2	3	4	5	6	7	8
7.	COCESNA/ Cenamer ACC	Cenamer FIR (Caribbean and Pacific Oceanic sectors / Sectores oceánicos Caribe y Pacífico)	ADS-B	S			Studies are being carried out. /Se están realizando estudios.
8.		Other air spaces./ Otros espacios aéreos					Studies are pending / Pendiente de estudios.
	<u>SAM</u>						
9.	Argentina	Ezeiza FIR Oceanic Zone / Zona Oceánica	ADS-C	P			Planned to be implemented at the end of the first trimester of 2007 / Planificado para ser instalado a finales del primer trimestre de 2007
10.	Brasil/ Atlántico ACC	Atlántico FIR	ADS-C	P			Trials have been carried out and It has an installation plan in the EUR/SAM corridor / Se han realizado ensayos y existe un plan de implantación en el corredor EUR/SAM.
11.	Chile/ Chile's ACC/ ACCs de Chile	Chile FIRs (Continental and Oceanic air space./ Espacios aéreos continental y oceánicos)	ADS-C	S			In the 2005 tests will be begun to implement ADS./ En el 2005 se comenzarán pruebas para implementar ADS.
12.		Other air spaces./ Otros espacios aéreos					Studies are pending / Pendiente de estudios.

P – Planned/Planificado S – Study/Estudio

APPENDIX D**SURVEILLANCE TASK FORCE
TERMS OF REFERENCE AND WORK PROGRAMME****1. Terms of reference**

- a) Development of a proposal on the regional surveillance systems implementation strategy by considering:
 - i. ATM defined requirements for the CAR/SAM Regions and the ICAO SARPs; and
 - ii. studies based on the ICAO operational requirements and the experiences from other regions of SSR in Mode S, ADS-B, multilateration, ADS-C and other surveillance systems in order to develop proposals to establish a CAR/SAM planning for these systems and to structure an action plan to implement the most adequate systems in the CAR/SAM regions.

2. Work Programme

- a) Propose surveillance systems susceptible to be implemented in the CAR/SAM regions.
- b) Develop an implementation plan for short and medium term ADS applications in the CAR/SAM regions including implementation deadlines by considering:
 - i. available equipment standards;
 - ii. preparation of airspace users and ATS providers;
 - iii. identify subregional areas (FIRs) where a positive cost-effectiveness benefit has been obtained from the short-term ADS implementation;
 - iv. develop a list of standardized and systematic tasks in order to implement ADS; and
 - v. collect and provide guidance material to educate States and airspace users about the requirements for the ADS implementation.

4. Composition

Brazil, Colombia, Cuba, France, Trinidad and Tobago, United States and COCESNA.

Note: The Task Force Coordinator will be elected by Members in the first meeting.

APPENDIX E

STATUS OF CONCLUSIONS FORMULETED DURING THE SUR/TF/1

CONCLUSIONS FORMULETED DURING THE SUR/TF/1				
Conclusion	Title	Contents	Status	Remarks
CNS SUR/TF 1/1	ADS-C TRIALS IN THE CAR/SAM REGIONS	That Brazil and Trinidad and Tobago be urged to conduct ADS-C trials with the following tentative schedule: <ol style="list-style-type: none"> i. Trials in Brazil; ii. Trials in the Piarco FIR; iii. the data and other results be informed to the ICAO NACC Office to be analyzed and coordinated through the GREPECAS CNS/SUR/TF; and iv. present an initial report on the analysis of the trials before 31 July 2008 to enable ICAO and the GREPECAS mechanism to present the results at the GREPECAS/15 Meeting tentatively to be held in October 2008. 		
CNS/SUR/TF 1/2	APPLICATION OF MULTILATERATION AS A SURVEILLANCE OPTION	That: <ol style="list-style-type: none"> a) States / International Organizations consider multilateration as a viable option to provide immediate surveillance coverage in geographical areas where secondary radar cannot be effectively deployed and at the same time it provides an economically effective transition to ADS-B when all aircraft are fully and correctly equipped; And b) Trinidad & Tobago and Brazil be urged to conduct trials in mutileration along similar guidelines used for the ADS-C trials as a transition path to ADS-B in the medium term. 		

CONCLUSIONS FORMULETED DURING THE SUR/TF/1				
Conclusion	Title	Contents	Status	Remarks
CNS/SUR/TF 1/3	ADS-B TRIALS	<p>To urge,</p> <ul style="list-style-type: none"> a) Cuba to continue its ADS-B trials in the Havana FIR; b) Trinidad and Tobago and the United States to establish and implement ADS-B trials project in the Piarco FIR; c) States/Territories/International Organizations from the CAR/SAM regions will be invited in the Project mentioned in b) above, expanding the trials in other airspaces and follow-up the execution and results of the projects mentioned in a) and b), as well as other initiatives; and d) all States/Territories/International Organizations who conduct trials and other ADS-B related activities, inform the ICAO NACC Office before 31 July 2008 on the status of implementation and results of their activities to ease the analysis and coordination through the GREPECAS CNS/SUR Task Force. 		
DECISION CNS/SUR/TF 1/4	DRAFT STRATEGY FOR THE CAR/SAM REGIONS FOR THE EVOLUTIONARY IMPLEMENTATION OF AERONAUTICAL SURVEILLANCE SYSTEMS	<p>That Brazil as a Member of the CNS/SUR/TF will develop a draft strategy for the CAR/SAM Regions for the evolutionary implementation of aeronautical surveillance in the CAR/SAM Regions by October 2007. The draft will be circulated via email for comments.</p>		