INTERNATIONAL CIVIL AVIATION ORGANIZATION

South American Regional Office

Second Meeting of the Surveillance Task Force of the CNS Committee (CNS/COMM) of the GREPECAS ATM/CNS Sub-Group (ATM/CNS/SG)

CNS/SUR/TF/2

REPORT

(Lima, Peru, 9 – 10 May 2008)

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HISTORY OF THE MEETING

1. PLACE AND DURATION OF THE MEETING

The Second Meeting of the Surveillance Task Force of the CNS Committee (CNS/COMM) of the GREPECAS ATM/CNS Sub-Group (ATM/CNS/SG), was carried out in the ICAO South American Regional Office, in Lima, Peru, from 9 to 10 May 2008.

2. OPENING

Mr. Carlos Stehli, Deputy Regional Director of the ICAO South American Regional Office, welcome the participants, pointing out the importance of the issues to be treated.

3. WORKING LANGUAGES

The meeting working language for the discussions and documentation was English.

4. PARTICIPANTS AND ORGANIZATION

The meeting counted with the assistance of 7 States and 3 International Organizations (Brazil, Bolivia, Cuba, France, Peru, Trinidad & Tobago, United States, COCESNA, IATA and Thales) making a total of 15 participants, including ICAO officers. The list of participants is being presented in pages iii-1 to iii-4.

Mrs. Veronica Ramdath, Rapporteur of the Surveillance Task Force of the CNS Committee of the GREPEGAS ATM/CNS Sub-Group, acted as moderator, assisted by Mr. Onofrio Smarrelli, Regional Officer of Communications, Navigation and Surveillance (CNS) of the ICAO South American Regional Office, and Mr. Julio Siu, Regional Officer of Communications, Navigation and Surveillance (CNS) of the ICAO North American and the Caribbean Regional Office.

5. LIST OF CONCLUSIONS /DECISIONS OF THE CNS/SUR/TF/2 MEETING

Second Meeting of the Surveillance Task Force (SUR/TF/2)
CNS Committee (CNS/COMM)
GREPECAS ATM/CNS Sub-Group (ATM/CNS/SG)

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Agenda Item 1: Follow-up on ADS-C, ADS-B and Multilateration Trials in the CAR/SAM Regions

1.1 The Meeting took note that to determine the feasibility of using ADS-B as a surveillance tool in the CAR/SAM Region, it is necessary to collect data to validate the quality of the ADS-B messages currently being broadcast and to identify the aircrafts that are ADS-B equipped.

1.2 ADS-B technology has been identified as the surveillance solution that can meet the needs of providing critical flight information simultaneously to several users as pilots and air traffic controllers. ADS-B transmits air traffic and flight information to aircraft, vehicles, and ground stations to improve situational awareness and provide unprecedented levels of service inside the cockpit and to air traffic control facilities.

1.3 The delegate of the United States informed the Meeting that ADS-B systems were operational in Alaska.

1.4 The Meeting recalled that at the first meeting of the Surveillance Task Force of the CNS Committee of the ATM/CNS Subgroup of GREPECAS, in June 2007, several members of the CAR/SAM region of the International Civil Aviation Organization expressed an interest in conducting an ADS-B data collection effort in the region. To determine the feasibility of using ADS-B as a surveillance tool in the CAR/SAM, it is necessary to collect data to validate the quality of the ADS-B messages currently being broadcast.

1.5 The United States informed that the CAR/SAM States that want to have ADS-B trials with the FAA should follow the process identified:

- The CAR/SAM State makes an official request via memorandum, e-mail, or fax to The Federal Aviation Administration (Office of International Aviation, AWH-10,800 Independence Ave. S.W., Washington D.C. (202) 267-5032 Fax).
- The FAA and the CAR/SAM State develop a bilateral agreement that both parties sign.
- Timeline established in accordance to terms of bilateral agreement.
- Start of the activities.

1.6 As informed by United States, the Meeting took note that for the ADS-B trials between the United States and the CAR/SAM States the following roles and responsibilities would apply:

1.7 The FAA-

a) Following request from a Civil Aviation Authority, negotiate and enter into a bilateral agreement;
b) Provide a contract vehicle for the participating State to procure turn-key surveillance services; and
c) Provide technical assistance in data reduction and analysis.

1.8 The CAR/SAM State:

a) Establish a bilateral agreement with the United States;
b) Provide ground-based surveillance technology;

c) Provide infrastructure necessary to install ground stations in suitable geographic locations; the infrastructure will include telecommunications, power, and equipment shelters;
d) Collect and record ADS-B messages from aircraft transitioning, departing, or landing at various airports; and
e) Participate in data reduction and analysis.

1.9 The Meeting took note that the following considerations are to be made for the implementation of the ADS-B trials:

_ the scope of ADS-B surveillance: for situational awareness or for separation;
_ the type of airspace: en-route, TMA, upper, lower, with or without existing radar coverage, and associated coverage;
_ the time frame considered;
_ Preparation and publication of necessary regulatory material;
_ Organization of controller training, users educations.

1.10 The Meeting also noted that to support the analysis of ADS-B implementation in a State or a region, ADS-B trials needed to be set-up to allow the direct observation and analysis of a number of parameters:

_ the status of the aircraft fleet in this state or region with respect to ADS-B equipage;
_ the local characteristics of the GPS signal, which directly generate the aircraft position reported by ADS-B;
_ The impact of local environment (physical, radio,) on the expected performance of the ADS-B surveillance.

1.11 Also the results of such trials contribute to a decision for implementation. It will support dialogue with airlines for buy-in and plans to equip (or understand reasons for reluctance), and it will provide inputs for the preparation of safety case.

1.12 The set-up for ADS-B trial can be simple, as it generally consists of a single channel ADS-B ground station (redundancy is not strictly necessary), associated with a GPS equipped/RAIM reporting site monitor, a local or remote and control system (depending on where the station is installed), data recording capability and replay/data analysis tools, and the availability of experts resource to carry out the analysis. The trial will provide more results if a radar covers the same area as the ADS-B ground station to afford the comparison of ADS-B and radar reports, tracks.

1.13 The Meeting noted the Methodology for Data Analysis and in this respect considered the following:

– Which data is to be recorded for analysis depends on the intended operations i.e. whether it is en-route overflights, en-route domestic, approach in large TMA, and/ or approach to small airports;
– Depending on the operations required, the performance assessment might differ.
– As an example of trial objectives the Meeting noted the following:
– Collection and analysis on a daily basis over a six-month period, the quantity and registration numbers of ADS-B equipped aircraft received by ADS-B ground station;
– Conclusion on the validity of the reports received to allow surveillance and/or separation of aircraft based on ADS-B
– Comparison of ADS-B targets to radar targets functionality and recommendations

1.14 Analysis to be carried out on data collected may include aircraft sorted by airline/type/the analysis of the content of the squitter (i.e. what are the fields provided, level of NUC), for the whole population of aircraft observed, establish a data base, identifying the aircraft with "good" ADS-B equipment and those with "bad"ADS-B equipment; the "bad" characteristic may come from an already identified issue or be a new one, for selected tracks with good NUC values assess:

- position accuracy, including investigation on along tracks error (on-board latency);
- update rate figures;
- the ground station range and compare with theoretical model;
- For selected tracks evaluate % of equipped aircraft.

1.15 Trials set-up in various places of the world allowed assessment of the overall performances of ADS-B:

- Percentage of aircraft equipped
- Percentage of aircraft broadcasting correct ADS-B data
- Measurement of update rate, NUC distribution
- Analysis of Call Sign correctness

1.16 The Meeting took note of the ADS-B, ADS-C and multilateration trials as identified at the SUR/TF/1:

1. The delegate of Cuba informed the Meeting that the phase of collecting ADS-B data from their first trials has been completed and that the results of the analysis will be sent to the TF members. Cuba also informed the meeting that more ADS-B trials will be done during the 2008-2010 period.
2. COCESNA informed the Meeting that:
   - ADS-B trials were conducted in order to obtain statistical information on the equipage of aircrafts in the Region. Refer to **Appendix A** of this Agenda Item.
   - ADS-C and CPDLC Communications: for the Pacific non radar-covered oceanic area of the Central America FIR, CENAMER Control Center is equipped with Data ADS/CPDLC Connection Servers (DataLink Servers–DLS). This system has the capacity to manage ADS/CPDLC communications provided by DataLink Suppliers, carry out the exchanges of messages between the aircrafts and the Data Terminal and the distribution of the ADS-C data to Surveillance Data Processor (SDP) for its process as ADS and ADS/SSR information, as well as the recording of these messages.

3. Trinidad and Tobago stated:
   - that they have not progressed with the ADS-B trials as identified in the SUR/TF/1 and explained that as custodian of the Piarco FIR they will eventually migrate to ADS-B as its main mode of surveillance in accordance with the Regional Plan. For the near to medium term surveillance will be via MSSR the existing and planned Radars which are relatively new and are expected to be available for use beyond 2015. Surveillance within the Piarco FIR should migrate to ADS-B via MLAT and that ADS-B trials are to be conducted not before 2015 within the FIR.
   - Trinidad & Tobago stated that implementation of ADS-C should be carried out in 2010/11 when the ATM System is fully up and running.

4 Brazil informed that:

   - it is expected that ADS-C reaches operational capability in Oct/2008, and that ADS/CPDLC FANS 1/A reaches operational capabilities in Apr/2009, using a final platform developed by ATECH.

- ADS-B and MLAT: During the past few years, Brazilian Administration has promoted modernization programs on current surveillance radar systems and has installed some new radar all over the country. The result of those initiatives is that current radar network in Brazil is considerably new (less than 7 years old) and the coverage for secondary radars is complete for the whole territory (FL 200 and above). Considering the above mentioned, Brazil has no plans in short terms to migrate to ADS-B or MLAT for En-route and TMA in continental areas.

  Nevertheless, there is a specific operational need in the Oil Platforms area close to Rio de Janeiro (Bacia de Campos) that might be suitable for trials on those technologies, since it represents an homogeneous airspace (helicopters only) that has partial radar coverage and would be a very good Test Bed for the comparison between the performance of those technologies and an actual radar system. Recently, DECEA, Petrobrás (Brazilian Oil Company) and the helicopters operators are working on the re-design of the routes (RNAV) based on GNSS procedures. It is expected that the design of new routes will be ready until September 2008. Once that work is done, it will be possible to have the surveillance operational needs that have to be met, in order to decide which technology would be the most appropriate to that area.

5. United States informed the Meeting that the ADS-B program in the United States will be deploying communications, weather, and ADS-B stations on oil platforms in the Gulf of Mexico, beginning this year 2008. Multilateration is being deployed in Colorado and Juneau, Alaska for surveillance services.

1.17 The Meeting noted the survey that was carried out by IATA on the aircraft on-board communication, navigation and surveillance equipment, which is presented in **Appendix B.** The meeting indicated that an explanation for the "ADS" column information should be given for its understanding, as well update the information of the Table of the airlines that operate in the CAR/SAM Region. IATA commented on the importance for the TF members feedback on this table.

1.18 The Meeting noted that the CAR/SAM Region would benefit from a collaborated effort and compilation of activities for ADS-B trials and in this regard elaborated a list of requirements with the associated parameters and criteria in order to promote the ADS-B trials in the Region. Refer to **Appendix C** for the list of activities.

1.19 Based on the above considerations, the Meeting formulated the following Conclusion:

CONCLUSION SUR/TF/02/01: ACTIVITY FOR ADS-B TRIALS

That States of the CAR/SAM Region that want to make trials in ADS-B take note of the activities list presented in Appendix C of this Report.

APPENDIX 1A

COCESNA ADS-B TRIAL ACTIVITIES

Introduction

This Appendix presents COCESNA's experience in the assessments carried out for the implementation of ADS-B System in the future. This presents a brief description referred to the capacities of the control centre, as well as information on studies performed in the field.

Analysis

ADS-B Trials and Implementation in CENAMER (COCESNA).

These trials were carried out with the purpose of obtaining statistical information on the ADS-B use of aircrafts using airspace controlled by COCESNA, in order to analyze de future use of the referred system and to increase surveillance coverage and redund current coverage (SSR radars Mode-S).

Phase I:

This phase consisted in monitoring the aircrafts that have this technology and that over fly the Central American airspace. The activities carried out were:

- Acquisition of a receptor equipment Mode-S/ADS-B (SBS-1) for the management of aircrafts signs. This equipment included a software application (base station) that shows the received information on a screen as a virtual radar allowing the presentation in real time of the aircrafts. In the application all equipped Mode-S/ADS-B aircrafts, within the receptor's coverage, are shown. The real coverage of this receptor is approximately 250 NM.

- Since January 30, tests have been carried out by a team based on COCESNA Headquarters in Tegucigalpa and in the Radar Site of Monte Crudo. Preliminary results indicate that several aircrafts of the main airlines fleets that over fly the central area of Honduras and its proximities use ADS-B regularly, among the monitored ones:

  Taca (Flights: THAI 390 391 215 214)
  UPS (Flights UPS 392 376 368 364)
  BSK (Flights BSK 670 671)
  American (Flights AAL 953 954 940 2166 945)
  Continental (Flights COA 14471868 1446 1447)
  Mexican (I Fly MXA 382)
  Spirit Wing (I Fly NKS 756)
  Airtransac (I Fly TSC 325)
  Servivensa (Flights SSV 328 3285)
  Iberia (Flights IBE 6313 6347)
  Lacsa (Flights LRC 643 642 654 655 8632)

In total, 61 aircrafts has been registered (in different days and with different assigned flights).

The following fields of information has been identified among the ADS data that has been gathered of these flights: Track position (longitude and latitude), call sign, Mode-S Address, Ground speed, Altitude, Vertical Rate and status (on-ground or during flight).

Phase II

Among the planned activities, data is to be collected in different points of the Central America FIR, specifically in radar sites to have a greater number of data with the best coverage to process as statistic information.

Prosecution of ADS data

With respect to the facilities and capacities available in COCESNA Air Traffic Control Centers and the actions undertaken in the planning and execution of tests for the prosecution of the Data ADS and CPDLC communications, mainly for the Pacific non radar-covered oceanic area of the of the Central America FIR, the following is indicated:

- COCESNA has in Ilopango, El Salvador a system that serves as a contingency back-up for CENAMER ACC Control Center, with the same functionalities for ATC.

- The current functions in both Control Centers can process ADS C data and manage CPDLC communications,

- CENAMER Control Center has ADS/CPDLC Data Connection Servers (DataLink Servers– DLS). This system has the capacity to manage ADS/CPDLC communications through connections provided by Datalink Suppliers, carry out the exchanges of messages between the aircrafts and the Data Terminal, the distribution of ADS data to the Surveillance Data Processors (SDP) for processing as ADS and ADS/SSR information, as well as the recording of all these messages.

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Airline	Airplane type	NAVIGATION																		SURVEILLANCE				COMMUNICATIONS					COMMENTS
		1 x FMS	2 x FMS	GNSS STAND ALONE	GNSS COUPLED TO FMS	IRU	RNAV DME/DME	RNAV DME/DME/IRU	RNAV GNSS	RNP 10	RNP 4 Oceanic	RNAV 5	RNAV 1	RNP 1.0	RNP .3	RNP <.3	SBAS	GBAS	FANS	ADS	ADS-B	Mode S	Mode S Enhan	HF	HF DATA LINK	ACARS	VDL 2	SATCOM	
Air Canada	A319		Y		Y	Y	Y	Y	Y	Y																Y			
	A320		Y		Y	Y	Y	Y	Y	Y									Y							Y			
	A330		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y						Y	Y	Y			Y		Y		Y	
	A340		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y						Y	Y	Y			Y		Y		Y	
	B767		Y		Y	Y	Y	Y	Y	Y		Y												Y		Y		Y*	*15 of 40 have SATCOM
Air Europa	A330-200		Y		Y	Y		Y		Y	Y	Y	Y		Y				Y	Y			Y	Y		Y	Y	Y	
	B737-800	Y			Y	Y		Y				Y	Y			Y							Y	Y			Y	Y	
	B767-300		Y		Y	Y		Y		Y	Y	Y	Y			Y						Y		Y					
Air France	A320		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y						Y	Y	Y	Y		Y			ADS-B OUT capable but not certified
	A330		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y	Y		Y		Y	ADS-B OUT capable but not certified
	A340		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y	Y		Y		Y	ADS-B OUT capable but not certified
	B747-200F		Y		Y	Y	Y		Y	Y	Y	Y	Y	Y	Y							Y	Y	Y		Y	Y		
	B747-400/400ERF		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y	Y		Y	Y	Y		Y	Y*	Y	*only 8 VDL2 equipped airplanes
	B777-200ER/300ER		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y	Y		Y	Y	Y		Y		Y	
American Airlines	A300-600		Y			Y		Y		Y		Y										Y		Y		Y			
	B737-800		Y		Y	Y			Y	Y			Y		Y							Y		Y		Y			
	B757-200		Y		Y*	Y		Y	Y*	Y			Y		Y*	Y*						Y*	Y*	Y		Y	Y*		* some aircraft (partial fleet)
	B767-200		Y			Y		Y		Y		Y										Y		Y		Y		Y*	* voice only
	B767-300		Y		Y*	Y		Y	Y*	Y			Y							Y*			Y	Y		Y	Y*	Y	* some aircraft (partial fleet)
	B777-200		Y		Y	Y			Y	Y			Y		Y				Y	Y			Y	Y		Y		Y	
	MD80			Y					Y				Y									Y				Y			
Brithish Airways	A319		Y		Y	Y		Y	Y			Y	Y	Y	Y						Y	Y	Y			Y			
	A320		Y*		Y*	Y		Y	Y*			Y	Y	Y	Y						Y	Y	Y	Y		Y			* except older A320s
	B737-400	Y				Y		Y				Y	Y	Y								Y	Y	Y		Y			
	B747-400		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y	Y					Y	Y	Y	Y		Y		Y	
	B767-300		Y	Y		Y		Y		Y		Y	Y									Y	Y	Y		Y			
	B777		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y		Y		Y	
Caribbean Airlines	B737-800		Y		Y	Y		Y	Y		Y					Y							Y		Y				
Continental Airlines	737-300	Y																				Y				Y			
	737-500		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y							Y				Y			
	737-700		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y	Y						Y		Y		Y			
	737-800		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y	Y					Y	Y		Y		Y			40 existing + 35 new by end-2007
	737-900		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y	Y						Y		Y		Y			
	757-200		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y	Y						Y	Y	Y	Y	Y			Mode S Enhanced in work to meet European mandate
	757-300		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y				Y			Y	Y	Y		Y	Y		
	767-200		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y				Y		Y	Y	Y	Y	Y	Y		Y	Mode S Enhanced in work to meet European mandate
	767-400		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y	Y			Y		Y	Y	Y	Y	Y	Y	Y	Y	Mode S Enhanced in work to meet European mandate
	777-200		Y		Y	Y		Y	Y	Y		Y	Y	Y	Y	Y			Y		Y	Y		Y	Y	Y		Y	Mode S Enhanced in work to meet European mandate
COPA	B737-700		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y						Y		Y	Y	Y			
	B737-800		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y						Y		Y	Y	Y			
	ERJ-190		Y		Y	Y	Y	Y	Y	Y	Y											Y		Y		Y			
Emirates	A310/F		Y		Y	Y	Y	Y	Y	Y		Y	Y	Y	Y							Y	Y	Y		Y			
	A330-200		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y		Y		Y	
	A340-300		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y		Y		Y	
	A340-500		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y		Y	
	B777-200/300		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y		Y		Y	
	B777-300ER		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y		Y		Y	
FedEx	A300		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y							Y	Y			Y	Y		
	A310		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y							Y	Y			Y	Y		
	B727			Y*								Y																	* approx. 20% of fleet has GPS
	MD-10		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y							Y	Y	Y	Y	Y	Y		
	MD-11		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Iberia	A319		Y		Y	Y	Y	Y	Y			Y	Y									Y	Y	Y		Y			
	A320		Y		Y	Y	Y	Y	Y			Y	Y									Y	Y	Y		Y			
	A340		Y		Y	Y	Y	Y	Y	Y		Y	Y									Y	Y	Y		Y		Y	
KLM	A330-200		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y						Y	Y		Y	Y	Y		Y		Y	
	B747-400		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y									Y	Y	Y		Y		Y	
	B747-400F		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y						Y	Y		Y	Y	Y		Y		Y	

IATA SURVEY

ON BOARD NAVIGATION, SURVEILLANCE AND COMMUNICATION EQUIPMENT

Airline	Airplane type	NAVIGATION																		SURVEILLANCE				COMMUNICATIONS					COMMENTS
		1 x FMS	2 x FMS	GNSS STAND ALONE	GNSS COUPLED TO FMS	IRU	RNAV DME/DME	RNAV DME/DME/IRU	RNAV GNSS	RNP 10	RNP 4 Oceanic	RNAV 5	RNAV 1	RNP 1.0	RNP .3	RNP <.3	SBAS	GBAS	FANS	ADS	ADS-B	Mode S	Mode S Enhan	HF	HF DATA LINK	ACARS	VDL 2	SATCOM	
	B777-200		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y						Y	Y		Y	Y	Y		Y		Y	
	MD-11		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y									Y	Y	Y		Y		Y	
LAN	A319-100		Y		Y	Y	Y	Y	Y	Y		Y	Y			Y								Y		Y			
	A320-200		Y		Y	Y	Y	Y	Y	Y		Y	Y			Y								Y	Y	Y			
	A340-300		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y						Y	Y			Y	Y		Y		Y	
	B767-300		Y		Y*	Y	Y	Y	Y	Y		Y	Y											Y	Y*	Y			*10 of 29 B767s have GPS. Non-GPS 767s have HF datalnk
Lufthansa	A340-300		Y		Y	Y		Y	Y				Y						Y			Y	Y	Y		Y	Y	Y	
	A340-600		Y		Y	Y		Y	Y				Y						Y			Y	Y	Y		Y	Y	Y	
	B747-400		Y		Y	Y		Y	Y				Y						Y			Y	Y	Y		Y	Y	Y	
Mexicana	A318		Y			Y		Y						Y								Y				Y			
	A319		Y			Y		Y						Y								Y		Y*		Y			* 3 of 16 have HF
	A320		Y			Y		Y						Y								Y		Y*		Y			* 20 of 30 have HF
	B757		Y			Y		Y				Y										Y				Y			
	B767		Y			Y		Y				Y										Y				Y			
Northwest	A319		Y			Y		Y		Y			Y									Y				Y			
	A320		Y			Y		Y		Y			Y									Y				Y			
	A330-200/300		Y		Y	Y		Y		Y		Y	Y		Y				Y	Y		Y	Y	Y		Y	Y	Y	
	B747-200					Y				Y		Y										Y		Y					
	B747-400		Y			Y		Y		Y		Y	Y									Y	Y	Y	Y	Y			
	B757-200/300		Y		Y*	Y		Y		Y		Y	Y									Y	Y	Y*		Y			* part of the fleet only
Pluna	B767-300		Y			Y	Y	Y		Y	Y	Y										Y		Y		Y			
SAA	A319		Y			Y				Y	Y	Y	Y	Y	Y									Y	Y	Y			
	A340-200		Y			Y				Y	Y	Y	Y	Y	Y									Y		Y		Y	
	A340-300		Y			Y				Y	Y	Y	Y	Y	Y				Y	Y	Y			Y	Y	Y		Y	
	A340-600		Y			Y				Y	Y	Y	Y	Y	Y				Y	Y	Y			Y	Y	Y		Y	
	B737-800		Y			Y				Y		Y												Y	Y*	Y			* 6 of 21 have HF datalink
	B747-400		Y	Y*	Y	Y				Y	Y	Y							Y*					Y	Y	Y		Y*	* some aircraft only. Only 4 aircraft have SATCOM.
TACA	A319		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y							Y		Y		Y			
	A320		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y							Y		Y		Y			
	A321		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y							Y		Y		Y			
TAM	A319		Y		Y	Y	Y	Y		Y		Y	Y		Y							Y		Y		Y		Y	
	A320		Y		Y	Y	Y	Y		Y		Y	Y		Y							Y		Y		Y		Y	
	A330-200		Y		Y	Y	Y	Y		Y		Y	Y	Y	Y				Y			Y	Y	Y		Y		Y	
	F100		Y			Y	Y	Y														Y		Y					
	MD-11		Y			Y	Y	Y		Y		Y										Y		Y					
United	A319/A320		Y		Y*	Y		Y	Y*			Y	Y	Y	Y*							Y				Y			*About 50% of fleet has GPS and is RNP 0.3 capable
	B737-300/500	Y				Y		Y				Y	Y									Y				Y			
	B757-200		Y			Y		Y				Y	Y									Y				Y			
	B767-300		Y		Y*	Y		Y	Y*	Y	Y	Y	Y	Y	Y							Y	Y			Y		Y	*About 40% of fleet has GPS and is RNP 0.3 capable
	B777-200		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y			Y		Y	
	B747-400		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y			Y		Y	
UPS	A300		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y							Y	Y	Y	Y		Y			
	B727			Y						Y		Y									Y	Y				Y			
	B747-100/200		Y			Y	Y	Y		Y	Y	Y									Y	Y	Y			Y			
	B757		Y			Y	Y	Y		Y	Y	Y									Y	Y	Y	Y*	Y*	Y			* HF and HFDL on 20 out of 75 airplanes
	B767		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y							Y	Y	Y	Y	Y	Y			
	DC-8					Y	Y	Y		Y		Y									Y	Y				Y			
	MD-11		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	Y		Y	
US Airways	A319/320/321		Y		Y	Y			Y						Y								Y	Y*		Y			* Some A319/320/321
	A330-300		Y		Y	Y			Y		Y				Y				Y	Y			Y	Y		Y		Y	
	B737-300 *	Y				Y		Y		Y		Y	Y	Y	Y														
	B737-300/400 **	Y				Y		Y		Y		Y	Y													Y			
	B757-200 (23N) ETOPS		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y			Y			Y		Y	Y	Y			
	B757-200 ETOPS		Y			Y		Y		Y	Y	Y	Y	Y	Y							Y		Y		Y			
	B757-200		Y			Y		Y		Y	Y	Y	Y	Y	Y											Y			
	B767-200		Y			Y		Y		Y	Y	Y	Y	Y	Y							Y		Y		Y			
	E-190		Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y					Y	Y	Y	Y			Y	Y		

APPENDIX 1C

Activities to be considered for ADS B Trial

1 Introduction

1.1 At the second meeting of the GREPECAS ATM/CNS Subgroup – CNS Committee, Surveillance Task Force, members of the CAR/SAM region of the International Civil Aviation Organization expressed an interest in conducting ADS-B trials in order to verify feasibility of using ADS-B as a surveillance tool in their States.

1.2 The Team discussed that there isn't a standardized way to plan, perform and check the actions involved in an ADS-B trial. Therefore, The TF coordinator assigned an ad hoc group in order to develop some guidelines for States.

2 Discussion

2.1 The ad hoc group has decided that five main topics should be considered by the States that are interested in performing some trials on ADS-B, which are:

- Planning Function
- Expected Criteria
- Test Parameters
- Trial Limitation
- Results Dissemination

2.1.1 Planning Function

There's a need to develop a Concept of Operations (CONOPS), in which the scope has to be clearly stated and what the operational requirements are, as well as the issues that have to be addressed (e.g. efficiency improvement, fuel savings, capacity enhancement, etc.)

The above mentioned CONOPS should also define what kind of service will be provided in the trial area (e.g. radar like service) and the complete schedule to perform the actions required, from planning to final report.

All stakeholders should be identified and brought to the program by promoting some user and customer conferences, to discuss the contents of the CONOPS and present the benefits of new technologies. It is also important to have some Airline candidates to commit and be part of the program from the beginning.

2.1.2 Expected Criteria

The ad hoc group understands that the items listed below should be satisfied in order to have an adequate justification for launching an ADS-B trial:

- The migration for an ADS-B environment should be cost effective;
- The use of the new technology must provide some safety benefit;
- The trial must be concluded in a reasonable time frame;
- The Air Navigation Service providers (ANSP) must get full commitment from users and regulators before the beginning of activities;
- It is important to have some radar coverage (at least partial) over the trial area to validate ADS-B position reports;
- A performance baseline for the designated areas of trials (e.g. existing routes) should be established to make future comparisons possible;
- A Cost Benefit analysis (CBA) should be performed for the customers by the ANSP; and
- Data collection should be performed and a safety case based on that data should be presented to regulators.

2.1.3 Test parameters

The ad hoc group understands that the parameters listed below should be measured during an ADS-B trial process.

- The update rate of the prototype system should be measured and compared to the expected rate, depending on the designated airspace (en-route, TMA, ground);
- The accuracy of the system should be evaluated by comparison with a known legacy system (e.g. secondary radars);
- The performance of the system should be monitored, in terms of NUC (for D260 compatible avionics) or Navigation Integrity Category (NIC), Navigation Accuracy Category (NAC), System Integrity Level (SIL) (for D260A compatible avionics);
- The probability of reception should also be measured over a very large sampling of flights;
- The flight ID sent by any aircraft should be assessed by the technical teams;
- The overall service availability must be measured and determined. Anomalies of all types shall be recorded and analyzed.

2.1.4 Trial Limitations

Some difficulties and limitations for an ADS-B trial were identified by the ad hoc group as follows:

- The trials should be limited to ADS-B out only;
- There is a need to validate the performance of the existing communication infrastructure;
- The spectrum within the trial area should be monitored in order to make sure that the frequency 1090MHz won't be affected for the legacy systems that are currently deployed;
- It is desirable to have a monitoring system for the health of the GPS constellation to validate its performance during the test event.

2.1.5 Results dissemination

During the trial processes, a dedicated team should be assigned to collect, organize and analyze data that will be used to write a complete report of the ADS-B trial results and to submit that report to GREPECAS through the Surveillance Task Force. These results and data should be sent to the Rapporteur of the Surveillance Task Force.

Agenda Item 2: Development of a Regional Strategy for Surveillance Implementation in the CAR/SAM Region

2.1 Under this agenda Item, ICAO presented the current surveillance aspects considered in the GREPECAS 14 and in the First Meeting of Surveillance task force of the CNS Committee with the status of implementation of the conclusions, as well as a summary of the current status of the SARPS and planning topics related to Surveillance Systems and an overview of the upcoming works in the ASP Panel. Under IP/02 and IP/03 are the detailed information about these references.

2.2 The Meeting took note of the current Regional CAR/SAM Strategic considerations: "Draft elements for a regional Strategy for Surveillance Systems", the "CAR/SAM Regional Strategy for the ADS-C/ADS-B System implementation" and "Potential air space to implement ADS-C and ADS-B considered by CAR/SAM states, territories, and international organizations" (Appendixes A, B and C of IP/02).

2.3 As a result of the first Surveillance Task Force Meeting, and in regards to GREPECAS/14 mandate, the Task Force presented an initial Unified Regional Surveillance Strategy, which was discussed and agreed to update based on the following considerations:

1. CAR/SAM Strategic considerations mentioned in the previous paragraph
2. ICAO surveillance documentation on IP02 and IP03
3. IATA information on aircraft on-board communication, navigation and surveillance equipment (Refer paragraph 1.18 of Report to Agenda Item 1)
4. Further comments of the members of this task Force.

2.4 This initial unified strategy is to be presented at the Sixth ATM/CNS Subgroup Meeting, to be held in Dominican Republic (30 June to 4 July 2008).

2.5 Based on the above the Meeting formulated the following decision:

DECISION SUR/TF/02/02: UPDATES OF INITIAL UNIFIED CAR/SAM SURVEILLANCE STRATEGY AND IATA SURVEY RESULTS.

1) The TF members are to review the initial Unified Regional Surveillance Strategy presented in the Meeting and the updated version of IATA survey results and present, ***no later than 23 May 2008***, any comments and observations to the Surveillance Task Force Rapporteur regarding these documents.

2) Surveillance Task Force Rapporteur is to:
   a) coordinate with the designated TF member (Brazil) and IATA for the respective consolidation and update of the mentioned documents.
   b) present the updated initial Unified Regional Surveillance Strategy to the ATM/CNS Subgroup Meeting in Dominican Republic.

3) IATA is urged to present a revised updated table of the CAR/SAM Region of their Surveillance Capabilities results Survey to the ATM/CNS Subgroup Meeting in Dominican Republic.

2.6 The meeting analyzed the results of the conclusion made during the First Surveillance Task Force Meeting (Trinidad & Tobago, 20-21 June 2007). The result is presented in **Appendix 2A** to this Agenda Item.

APPENDIX 2A

STATUS OF CONCLUSIONS FORMULATED DURING THE SUR/TF/1

CONCLUSIONS FORMULATED 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: 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.	Valid	Paragraph 1.17 of Agenda Item 1 indicates some trials in ADC C in the CAR SAM Region.

CONCLUSIONS FORMULATED DURING THE SUR/TF/1				
Conclusion	**Title**	**Contents**	**Status**	**Remarks**
CNS/SUR/TF 1/2	**APPLICATION OF MULTILATERATION AS A SURVEILLANCE OPTION**	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 mutilateration along similar guidelines used for the ADS-C trials as a transition path to ADS-B in the medium term.	Valid	Paragraph 1.17 of Agenda Item 1 indicates some trials in Multilateration. in the CAR/SAM Region

CONCLUSIONS FORMULATED DURING THE SUR/TF/1				
Conclusion	**Title**	**Contents**	**Status**	**Remarks**
CNS/SUR/TF 1/3	**ADS-B TRIALS**	To urge, Cuba to continue its ADS-B trials in the Havana FIR; Trinidad and Tobago and the United States to establish and implement ADS-B trials project in the Piarco FIR; 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 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.	Valid	Paragraph 1.17 and APPENDIX A indicates some trials in ADS B in the CAR/SAM Region

CONCLUSIONS FORMULATED DURING THE SUR/TF/1				
Conclusion	**Title**	**Contents**	**Status**	**Remarks**
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.	Valid	A draft strategy was presented to the meeting, commentary was made, additional commentary is expected to obtain from the members of the task force not later than 23 May 2008 (Decision SUR/TF/02/02) The initial Strategy will be presented at the Sixth ATM/CNS Subgroup.

Agenda Item 3: Development of an initial Plan for ADS implementation

3.1 This agenda item was considered under the Agenda Items Nos. 1 and 2.

Agenda Item 4: Other matters

4.1 The meeting took note of the current terms of reference as indicated in Appendix D of IP/2 and was invited to review the term of reference and work programme of the Surveillance Task Force (Appendix D of IP/02 of CNS/SUR/TF/02) and once revised to send their comments to the Surveillance TF Rapporteur **no later than the 30 of June of 2008.**

4.2 The delegate of Martinique offered to host the next surveillance task force meeting in Martinique, planned to be held on the second quarter of 2009.