International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)
Fifteenth Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/15)
Rio de Janeiro, Brazil, 13 to 17 October 2008

Agenda Item 3: Review of the Reports of GREPECAS Contributory Bodies

3.6 Report of the ATM/CNS/SG/6 Meeting

REPORT OF THE SIXTH MEETING OF THE CNS COMMITTEE

(Presented by the Chairperson of the CNS Committee)

SUMMARY

This working paper contains a summary of the results and relevant aspects of the sixth meeting of the CNS Committee, for consideration by the GREPECAS/15 Meeting.

Reference:

Report of the CNS/COMM/6 meeting (Attachment 2 to the report of the ATM/CNS/SG/6 meeting) held in Boca Chica, Dominican Republic, from 30 June to 4 July 2008.

1. Introduction

1.1 The sixth meeting of the CNS Committee (CNS/COMM/6) reviewed six agenda items and formulated 8 draft conclusions for consideration by GREPECAS/15. A summary of the results and relevant aspects of the aforementioned meeting is shown below. The draft conclusions are included in the **Annex** to this paper.

2. Report of the CNS/COMM/6 meeting, as reviewed by the ATM/CNS Subgroup

2.1 Agenda Item 1: Development of communication systems

Review of the progress made in the interconnection/integration of digital networks

MEVA II / REDDIG interconnection

2.1.1 Note was taken of the activities that were pending for the implementation of the MEVA II/REDDIG interconnection, with respect to focal points, REDDIG management, the MEVA II service provider, acceptance of the MoU for the MEVA II/REDDIG interconnection, satellite contingency plan, and the update of the respective action plan.

2.1.2 A review was made of the timetable of activities specified in the revised action plan approved by the sixth MEVA II/REDDIG coordination meeting (MR/6), in which it was estimated that this interconnection process would be completed by the first half of 2009.

Follow-up on the implementation/planning of air-ground data links

2.1.3 Note was taken of the update of the CAR/SAM Regional Plan for the Aeronautical Mobile Service (AMS) and the Aeronautical Mobile Satellite Service (AMSS), contained in Table CNS 2A of the CAR/SAM Regional Air Navigation Plan, Doc 8733, Volume II (FASID), notified to the States as an amendment through the ICAO Regional Offices. The meeting also took note of the action taken and the considerations made in the CAR and SAM Regions, respectively, regarding the implementation of air-ground data links.

2.1.4 Considering that, in general, the new versions and models of AMS VHF radio equipment are capable of data transmission (generally in VDL Mode 2), that some CAR/SAM States have acquired these new VHF radio equipment versions, which are currently operating in the Regions, and that some aircraft are equipped with radios capable of data transmission (VDL 2), it was concluded that studies could be undertaken for the conduction of VDL data transmission trials. Accordingly, it was proposed that ICAO organise a seminar to disseminate experiences regarding the implementation of data transmission in other regions, the functionalities or applications of those links, the SARPs already in place and those foreseen by ICAO in this area, as well as information related to future air-ground data communication systems. In this respect, the meeting formulated **Draft Conclusion CNS/6/1 - Seminar/workshop on the implementation of air-ground data links and their applications.**

Follow-up on the implementation of ATN and its applications

2.1.5 As a follow-up to ALLPIRG Conclusion 5/2, it was felt that ATN implementation plans and its applications in the CAR/SAM Regions were in line with global plan initiatives GPI-17 (implementation of data link applications) and GPI-22 (communication infrastructure).

2.1.6 A review was made of the preliminary ATN router plan (Table CNS 1Ba) for the CAR and SAM Regions, which is analysed in **Appendices A** and **B** to this working paper, respectively.

2.1.7 The timetable of IP protocol communication trials was analysed with a view to determining circuit performance and the appropriate link speed for the ATN network, and in this respect, completing table CNS 1Ba, including the following tests: between the MTAs of Argentina-Paraguay, Argentina-Brazil, United States-COCESNA and between domestic MTAs in Brazil and Argentina; between MTA and UA: in Argentina-Peru and domestic tests between MTA and UA in Argentina and Brazil; radar transmission: Venezuela-Brazil and Jamaica-COCESNA and voice over IP between Argentina-Brazil. The results of these tests, which are foreseen for February 2009, will also be used to analyse the ATN topology for the CAR/SAM Regions, to determine the associated economic impact, and to study the need to conduct studies on bandwidth increases, delays, and other considerations related to regional networks, in view of the implementation in the short term of new services in the States/Territories/International Organisations.

2.1.8 The plans for implementing ATN ground-ground applications, shown in FASID table CNS1Bb, were reviewed and updated (see **Appendices C** and **D** to this working paper**).** From this information, it was noted that AMHS would be implemented in most CAR/SAM States and Territories by 2015. Regarding AIDC implementation, it was noted that an implementation date had not been defined yet. Also, note was taken in table CNS 1Bb of the use of protocol IP as a standard for ATN ground-ground applications, and that the IP protocol, version 4, was being used for AMHS systems implemented in the CAR/SAM Regions, in keeping with the preliminary approach for IP implementation in the CAR/SAM Regions (initial use of Internet protocol Version 4 (IPv4) to expedite implementation of the ATS/MHS service in the CAR/SAM Regions, and of Protocol IPv6 for inter-regional connectivity). A transition phase was also foreseen, in which a dual stack transition mechanism would be applied, with IPv4 and IPv6 being implemented in the AMHS systems, leading to a network based only on IPv6 and making IPv4 inoperative.

2.1.9 The CAR/SAM regional AMHS transition plan envisages the implementation of AMHS and the AFTN-AMHS gateway, as specified in ICAO Doc 9880 Part IIB, to replace the existing AFTN system, covering operational requirements and the necessary provisional measures during the transition period. This plan will be implemented by the fifth meeting of the ATN Task Force (end of the first quarter of 2009).

2.1.10 Two feasible options were agreed upon for TCP/IP implementation:

a) AMHS using RFC1006 over TCP/IP (IPv4) routers for direct AMHS interface with IPv4 routers for intra-regional connections; and

b) AMHS configuration, as specified in a), with IPv4-to-IPv6 conversion capability, through the implementation of an IP router gateway function for inter-regional connections.

2.1.11 A review was made of the CAR/SAM IP addressing plan presented by the ATN Task Force, which is based on an IPv4 private address space, taking into account the limited availability of IPv4 public addresses and the potential IPv6 transition plan (refer to **Appendix E** to this working paper). The aforementioned plan will be sent to ICAO for review.

2.1.12 The CAR/SAM preliminary AMHS addressing plan was reviewed (see **Appendix F** to this working paper) and consideration was given to the importance of establishing an entity to manage the AMHS addressing scheme and coordinating this work with other ICAO Regions. In this sense, it was decided that ICAO would invite EUROCONTROL to demonstrate the operation of the ATN message management unit (AMC) at the fifth meeting of the ATN Task Force.

2.1.13 It was felt that the regional ATN ground-air application plan would be completed once the ICAO SARPs for ATN IPS for ground-air applications were developed.

Communication considerations to foster the migration to the exchange of meteorological messages in BUFR code

2.1.14 It was noted that the ICAO Air Navigation Commission, at the fourth meeting of its 176 Session, had decided to suspend the migration of the BUFR code until the WMO Panel had completed the studies on the use of XML for OPMET exchange. Consequently, the ATN Task Force and the COMMET Group of the MET Subgroup should suspend their studies of the communication aspects for the migration to the exchange of meteorological messages in BUFR code. It was also noted that the WMO Panel had not yet begun the study of XML for the transmission of OPMET messages (METAR/SPECI and TAF) and that these activities were expected to end by the year 2009. In this respect, it was felt that, as part of the studies on the application of XML for OPMET message transmission, this WMO group, together with ICAO, should analyse the possible impact on the systems that are replacing the AFTN, like, for example, the AMHS system, which is increasingly being implemented in the CAR/SAM Regions and in other regions of the world. The meeting formulated **Draft Conclusion CNS/6/2 – ICAO participation in the study of the new formats for the transmission of OPMET information.**

2.2 Agenda Item 2: Development of navigation systems

Review of the regional GNSS implementation plan

Proposed amendment to the Regional Air Navigation Plan - FASID Table CNS/3

2.2.1 Considering that the current Air Navigation Plan does not contemplate the planning of aircraft-based GNSS augmentation systems, and taking into account the need for short- and medium-term plans for the use of aircraft-based augmentation systems to meet PBN requirements, a proposed amendment to Table CNS 3 of the CAR/SAM Air Navigation Plan was approved (see **Appendix G** to this working paper), consisting of the addition of a new column entitled "ABAS" under GNSS requirement. In this respect, the meeting approved **Draft conclusion CNS 6/3 - Amendment to the Regional Air Navigation Plan – FASID Table CNS/3**.

Follow up on the planning/implementation of SBAS and GBAS augmentation systems in the CAR/SAM Regions

2.2.2 Taking into account the conclusion of the GNSS Task Force in the sense that currently available ionosphere data should be used in the studies conducted by project RLA/03/902 and that States with GNSS receivers, like, for instance, the members of project RLA/00/009, should report on the operational condition of such receivers, together with information on other available GNSS receivers capable of collecting L1 and L2 data every second, and inform ICAO Regional Offices on the geographical location and type of equipment so that Project RLA/03/902 may analyse the feasibility of using such data for its studies, the meeting approved **Draft Conclusion CNS 6/4 – Availability of GPS receivers for ionosphere studies and analyses conducted under project RLA/03/902**.

2.2.3 Note was taken of the systematic and operational improvements of the United States SBAS system (WAAS) and that, with the increased use of SBAS, it was essential for operational requirements and procedure design criteria to be harmonised at the global level. Information was provided on the results of Phase II of project RLA/03/902 SACCSA, and of the comments made by the members of the project concerning the importance of incorporating more States to project Phase III. Accordingly, the meeting formulated **Draft Conclusion CNS 6/5 - Acceptance of SBAS and support to project RLA/03/902-SACCSA**.

2.2.4 Information was provided about the GBAS work programme of Brazil, GBAS activities that have been conducted by the United States, and the importance of collecting local data for the implementation of GBAS stations, as a way of verifying if the risk model used can ensure the safety of operations.

2.2.5 Note was taken of the future task of the GNSS task force regarding the development of a regional strategy for the evolution of navigation systems to support the CAR/SAM PBN roadmap, in order to guide the States in the development of their national plans and the users of air navigation services. Consideration was also given to the need to form national CNS groups for planning GNSS implementation in the short, medium, and long term.

2.2.6 Agreement was reached on the need to plan the short-term implementation of RAIM GPS, GPS with Baro-VNAV in the CAR/SAM Regions, in order to comply with the implementation of the CAR/SAM PBN roadmap. Accordingly, the meeting formulated **Draft Conclusion CNS 6/6 – Use of GNSS in the short term**.

2.2.7 Brazil informed of its plans to implement the ATM operational concept, supported by CNS/ATM systems, in the short, medium and long run, and that it was not foreseeing to implement an SBAS system to support operations in the Brazilian airspace.

Regional plan for the deactivation of NDB systems

2.2.8 Note was taken of the activities conducted by ICAO in order to obtain the plans for the deactivation of NDB stations by the States, and that the information provided by some States/Territories/International Organisations was not complete. Therefore, in order to complete the Regional NDB station gradual deactivation plan, all States should review and complete the required information. An initial version of the plan was prepared (see **Appendix H** to this working paper). As a result, the Meeting agreed on **Draft Conclusion CNS 6/7 - Review of the plan for the gradual deactivation of NDB stations.**

2.3 Agenda item 3: Development of surveillance systems

Review of the regional strategy for the implementation of CAR/SAM surveillance systems

Follow-up on planning/implementation/trials of surveillance systems (ADS-C, ADS-B, radar Mode S, multilateration, etc.)

2.3.1 Note was taken of the activities carried out by the surveillance task force at its two meetings since the fifth meeting of the CNS Committee. A review was made of the preliminary document on the regional unified surveillance strategy prepared by the surveillance task force, which appears in **Appendix I** to this working paper.

2.3.2 The meeting took note of ADS-C, ADS-B and multilateration trials conducted by CAR/SAM States/Territories/International Organisations. Information in this respect is contained in **Appendix J** to this working paper.

2.3.3 The meeting was also informed about the work done by the surveillance task force regarding ADS-B trials. **Appendices K** and **L** to this working paper contain the respective information, to be taken into account by the States/Territories/International Organisations when conducting ADS-B trials on their own or with the FAA, respectively.

2.3.4 Note was also taken of the study for the adoption of an ADS-B service provision model, its main benefits, and the basic ADS-B performance service parameters adopted by APANPIRG/18. The meeting felt that the surveillance task force should review this study within the programme of activities of ADS-B trials.

Considerations on surveillance and communication systems for the integration of automated ATM systems and ATFM requirements

2.3.5 As a result of the automation activities carried out under Technical Cooperation Project RLA/03/908, the meeting was informed about the surveillance and communication systems for the integration of ATM automated systems in CAR/SAM ACCs. Information was also provided about automation activities carried out in the CAR and NAM Regions by the NACC working group, highlighting the various radar data sharing activities, the proposed use of the current flight plan (CPL) for the exchange of updated flight plan data, the level of automation of control centre systems, and digital communication developments in the region. These automation aspects were analysed by the *ad hoc* automation group, made up by delegates of the CNS and ATM Committees, and the results of this analysis are shown in GREPECAS/15 WP/12.

Standard regional registry for aircraft with Mode S transponder

2.3.6 The meeting took note of the aspects to be taken into account for a standard registry of aircraft with mode S transponder, as detailed in **Appendix M** to this working paper.

2.4 Agenda Item 4: Review of CNS deficiencies and other general aspects

Review of the status of air navigation deficiencies related to CNS systems

2.4.1 The meeting reviewed the list of CNS deficiencies and considered that the States should review and update the list, taking into account the classification of "U" deficiencies adopted by the eighth meeting of the Aviation Safety Board (ASB/8), applying the risk analysis method of the ICAO Safety Management System (SMS) methodology. The updated information on CNS deficiencies is contained in WP/16, to be discussed under Agenda Item 4.2 of the GREPECAS/15 meeting.

Review and update of GREPECAS outstanding conclusions/decisions related to CNS

2.4.2 The status of GREPECAS outstanding conclusions/decisions related to CNS was analysed. This information is contained in WP/03, to be discussed under Agenda Item 1.2 of the GREPECAS/15 meeting.

Results of the ITU 2007 World Radiocommunication Conference (WRC-2007) and the initial position of ICAO for ITU WRC-2011

2.4.3 The meeting took note of the results of the WRC-2007 meeting, as well as of the preliminary ICAO position for WRC-2011. The meeting considered that CAR/SAM States and International Organisations should support and follow up the work of ICAO on the preparation and update of ICAO position for WRC-11, y formulated **Draft Conclusion CNS/6/8 - CAR/SAM regional activities in preparation for, and in support of, ICAO position for CMR- 11.**

2.5 **Agenda Item 5: Future organisation of CNS work within GREPECAS**

2.5.1 The meeting reviewed the terms of reference and work programme of the current CNS Committee and its task forces, presenting them in a format that linked activities to the task number, the ICAO strategic objective(s), references to the Regional Air Navigation Plan (FASID), and the valid applicable conclusions/decisions of GREPECAS, associating each activity to expected outcome, person responsible, target dates for the delivery of this outcome, and a breakdown of activities according to the instructions of the seventh meeting of the Administration Coordination Group (ACG/07) through Decision ACG/07/02. Working paper 18 contains the terms of reference and the revised work programme of the CNS Committee.

3. **Suggested action**

3.1 The Meeting is invited to:

a) take note of the information presented in this working paper;
b) review the draft conclusions contained in the Annex to this paper, as well as the associated Appendices; and
c) discuss other aspects that are deemed relevant.

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ANNEX

CNS/06 COMMITTEE DRAFT CONCLUSIONS

DRAFT
CONCLUSION CNS/6/1 SEMINAR/WORKSHOP ON THE IMPLEMENTATION OF AIR-GROUND DATA LINKS AND ITS APPLICATIONS

To support the study of the trial plan for air-ground data transmission and the functionalities or applications implemented through these links, ICAO is urged to plan and convene a Seminar/Workshop on this respect to be held for the last quarter of 2009.

DRAFT
CONCLUSION CNS/6/2 PARTICIPATION OF ICAO IN THE NEW FORMATS STUDIES FOR THE TRANSMISSION OF OPMET INFORMATION

That ICAO actively participate in the work of the WMO groups of experts on the XML studies for the transmission of OPMET messages, in order to avoid what happened to the migration of OPMET messages to the BUFR code.

DRAFT
CONCLUSION CNS/6/3 AMENDMENT TO THE REGIONAL AIR NAVIGATION PLAN – TABLE CNS/3 OF FASID

That ICAO consider amending the format of the Regional Air Navigation Plan Table CNS 3 of the FASID by adding a new column under GNSS requirements to reflect the planning of ABAS requirements, as shown in the Appendix A to this part of the report.

DRAFT
CONCLUSION CNS/6/4 AVAILABILITY OF GNSS RECEIVER FOR PROJECT RLA/03/902 IONOSPHERIC ANALYSES AND STUDIES

In order to support the ionospheric analyses and studies being conducted by project RLA/03/902, CAR/SAM States/Territories/International Organizations are urged to inform ICAO, through their respective Regional Offices, no later than GREPECAS/15**,** about the existence and availability of GNSS receivers with an L1 and L2 data collection capability per second**,** reporting their geographic location and the type of equipment.

DRAFT
CONCLUSION CNS/6/5 ACCEPTANCE OF AN OWN SBAS AND SUPPORT FOR PROJECT RLA/03/902-SACCSA

Bearing in mind

- that Phase III of SACCSA could provide definitive elements for decision-making by the CAR/SAM Regions with regard to the implementation of an own SBAS;

- that the proposed ionosphere studies are of considerable importance for gaining a knowledge and characterizing of its actual behaviour and, therefore, for the implementation/planning of the GNSS solution;

- the importance of having CAR/SAM States be willing to be incorporated into and participate in Phase III of RLA/03/902 SACCSA for the efficient completion of the project,

States/Territories/International Organizations are urged to:

a) present, within the GREPECAS mechanism, their will to implement an own SBAS, in case the results of the SACCSA Phase III proves the feasibility to implement a SBAS in the CAR/SAM Regions.

b) express their support for Phase III of project RLA/03/902 SACCSA and their willingness to participate in it.

DRAFT
CONCLUSION CNS/6/6 SHORT-TERM GNSS USE

In order to support the development of the PBN National Plans according to PBN roadmap in the CAR/SAM Regions, States/Territories/International Organizations are urged to complete the development and approval of NPA operations based on GPS, establishing regulations and procedures (NOTAM, AIC, etc.) for the use of GPS RAIM, short-term Baro-VNAV GPS.

DRAFT
CONCLUSION CNS/6/7 REVIEW OF THE PLAN FOR THE PROGRESSIVE DEACTIVATION OF NDB STATIONS

That States/Territories /International Organisations review and complete the information on the Regional Plan for the Progressive Deactivation of NDB Stations in the CAR and SAM Regions that appears in Appendix B to this part of the Report and send in the missing information to the respective ICAO Regional Offices before **30 September 2008.**

DRAFT
CONCLUSION CNS/6/8 CAR/SAM REGIONAL ACTION FOR THE PREPARATION AND SUPPORT OF THE ICAO POSITION FOR WRC-11

That CAR/SAM States and international organisations, in preparation and support of the ICAO position for the ITU World Radiocommunication Conference – 2011 (WRC-11), should:

a) support and follow up on the work of ICAO to prepare and update its position for WRC-11;

b) appoint a focal point or a person to serve as a liaison with ICAO and with the national radio frequency spectrum management authority to coordinate matters concerning WRC-11;

c) participate actively in the Organization of American States (OAS) CITEL meetings in preparation for WRC-11;

d) participate actively in any meetings and seminars convened by ICAO to explain and analyse the position of this organization for WRC-11;

e) participate actively in WRC-11 in support of the ICAO position; and

f) recommend and implement other appropriate measures

APPENDIX A / APÉNDICE A

TABLE/TABLA CNS 1Ba –ROUTERS REGIONAL PLAN / PLAN REGIONAL DE ENCAMINADORES REGION CAR/ CAR REGION

Administration and Location/ Administración y Localidad	Type of Router / Tipo de Encaminador	Type of Interconnection / Tipo de interconexión	Connected Router-Encaminador Conectado	Link Speed-Velocidad del enlace	Link Protocol-Protocolo del Enlace	Via Vía	Target Date / Fecha Meta	Remarks Observaciones
1	2	3	4	5	6	7	8	9
Anguilla	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
Antigua	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
Aruba	IP	Intra Regional	Jamaica (Kingston), Curacao	TBD	IPv4	MEVA	TBD	
Bahamas/Nassau	IP	Intra Regional	Haiti (Port –of-Prince), USA (Miami)	TBD	IPv4	MEVA	TBD	
Barbados	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
Belice/Belice	IP	Intra Regional	Honduras – COCESNA (Tegucigalpa)	TBD	IPv4	CAMSAT	2008	
British Virgin Islands (Tortola)	IP	Intra Regional	USA (Miami)	TBD	IPv4	MEVA	TBD	
Cayman I.	IP	Intra Regional	Jamaica (Kingston), Cuba (La Habana)	TBD	IPv4	MEVA	TBD	
Costa Rica/San José	IP	Intra Regional	Honduras – COCESNA (Tegucigalpa)	TBD	IPv4	CAMSAT	2008	
Cuba/La Habana	IP	Intra Regional	Haiti (Port –of-Prince), USA (Miami), Jamaica (Kingston), Cayman I., Honduras – COCESNA (Tegucigalpa)	TBD	IPv4	MEVA	TBD	
			Mexico	TBD	IPv4	TBD	TBD	
Curacao	IP	Intra Regional	Aruba, Dominican Republic (Sto. Domingo), Haiti (Port of Prince), Jamaica (Kingston), Puerto Rico (San Juan)	TBD	IPv4	MEVA	TBD	
Dominican Republic/ Sto. Domingo	IP	Intra Regional	Haiti (Port of Prince), Puerto Rico (San Juan), Curacao / Miami	TBD	IPv4	MEVA	TBD	

Administration and Location/ Administración y Localidad	Type of Router / Tipo de Encaminador	Type of Interconnection / Tipo de interconexión	Connected Router- Encaminador Conectado	Link Speed- Velocidad del enlace	Link Protocol- Protocolo del Enlace	Via Vía	Target Date / Fecha Meta	Remarks Observaciones
1	2	3	4	5	6	7	8	9
El Salvador/San Salvador	IP	Intra Regional	Honduras – COCESNA (Tegucigalpa)	TBD	IPv4	CAMSAT	2008	
French Antilles (Martinique)/ Fort-au-France	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
French Antilles (Guadalupe)/ Point-a Pitre	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
Grenada	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
Guatemala/La Aurora	IP	Intra Regional	Honduras – COCESNA (Tegucigalpa)	TBD	IPv4	CAMSAT	2008	
Haiti/Port au Prince	IP	Intra Regional	Bahamas, Cuba (La Habana), Curacao, Dominican Republic (Sto. Domingo), Jamaica (Kingston)	TBD	IPv4	MEVA	TBD	
Honduras/Tegucigalpa COCESNA	IP	Intra Regional	Belice (Belice), Costa Rica (San Jose), Guatemala (La Aurora), Honduras (San Pedro Sula), Nicaragua (Managua),	TBD	IPv4	CAMSAT	2008	
		Inter/ Intra Regional	Cuba (La Habana), NAM (Atlanta), Panama, USA (Miami)	TBD	IPv4	MEVA	TBD	
		Intra Regional	Mexico	TBD	IPv4	TBD	TBD	
Honduras/ San Pedro Sula	IP	Intra Regional	Honduras – COCESNA (Tegucigalpa)	TBD	IPv4	CAMSAT	2008	
Jamaica/Kingston	IP	Intra Regional	Aruba, Cayman I., Cuba (La Habana), Curacao, Haiti (Port of Prince).	TBD	IPv4	MEVA	TBD	
Mexico	IP	Inter/ Intra Regional	Cuba (La Habana), Honduras (Tegucigalpa), NAM (Atlanta),	TBD	IPv4	TBD	TBD	
Monserrat	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	

Administration and Location/ Administración y Localidad	Type of Router / Tipo de Encaminador	Type of Interconnection / Tipo de interconexión	Connected Router-Encaminador Conectado	Link Speed-Velocidad del enlace	Link Protocol-Protocolo del Enlace	Via Vía	Target Date / Fecha Meta	Remarks Observaciones
1	2	3	4	5	6	7	8	9
Nicaragua Managua	IP	Intra Regional	Honduras – COCESNA (Tegucigalpa)	TBD	IPv4	CAMSAT	2008	
Puerto Rico/San Juan	IP	Inter/ Intra Regional	Curacao, Dominican Republic (Sto. Domingo), USA (Miami).	TBD	IPv4	MEVA	TBD	
			SAM (Caracas), Trinidad and Tobago (Piarco)	TBD	IPv4	TBD	TBD	
St. Kitts & Nives	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
St. Lucia	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
St Marteen	IP	Intra Regional	USA (Miami)	TBD	IPv4	MEVA	TBD	
St. Vincent	IP	Intra Regional	Trinidad and Tobago (Piarco)	TBD	IPv4	Eastern Caribbean Network	TBD	
Turks & Caicos/Grand Turk	IP	Intra Regional	USA (Miami)	TBD	IPv4	MEVA	TBD	
Trinidad and Tobago/Piarco	IP	Intra Regional	Angula, Antigua, Barbados, French Antilles (Fort-au-France, Point-a-Pitre), Grenada, Monserrat, St. Kitts & Nives, St. Lucia, St. Vincent	TBD	IPv4	Eastern Caribbean Network	TBD	
		Intra Regional	Puerto Rico (San Juan)	TBD	IPv4	TBD	TBD	
		Inter Regional	EUR (Madrid),	TBD	IPv4	TBD	TBD	
		Inter Regional	SAM (Caracas)	TBD	IPv4	REDDIG	TBD	

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APPENDIX B / APÉNDICE B

TABLE/TABLA CNS 1Ba –ROUTERS REGIONAL PLAN / PLAN REGIONAL DE ENCAMINADOTES
SAM REGION / REGIÓN SAM

Administration and Location/ Administración y Localidad	Type of Router / Tipo de Encaminador	Type of Interconnection/ Tipo de interconexión	Connected Router- Encaminador Conectado	Link Speed- Velocidad del enlace	Link Protocol- Protocolo del Enlace	Via Vía	Target Date / Fecha Meta	Remarks Observaciones
1	2	3	4	5		7	8	9
Argentina/Buenos Aires	IP	Inter/Intra Regional	AFI (Johannesburgo), Bolivia (La Paz), Chile (Santiago), Brazil (Brasilia), Paraguay (Asunción), Perú (Lima), and/y Uruguay (Montevideo)	TBD	IPv4	CAFSAT REDDIG	2008	
Bolivia/La Paz	IP	Intra Regional	Argentina (Buenos Aires), Brazil (Brasilia) and/y Perú (Lima)	TBD	IPv4	REDDIG	2010	
Brazil/Manaus	IP	Intra Regional	Colombia (Bogotá), Guyana (Georgetown), Guyana Francesa (Cayena), Perú (Lima), Surinam(Paramaribo), and/y Venezuela (Caracas)	TBD	IPv4	REDDIG	2009	
Brazil/Brasilia	IP	Inter/Intra Regional	AFI (Dakar),EUR(Madrid) NAM (Atlanta) via Colombia (Bogotá), Argentina (Buenos Aires), Bolivia (La Paz), Paraguay (Asunción), and/y Uruguay (Montevideo)	TBD	IPv4	CAFSAT REDDIG	2009	
Chile/Santiago	IP	Inter/Intra Regional	PAC (Christchurch), Argentina (Buenos Aires) and/y Perú (Lima)	TBD	IPv4	PTT REDDIG	2008	
Colombia/Bogotá	IP	Inter/Intra Regional	NAM (Atlanta)*, Ecuador (Guayaquil), Brazil (Manaus); Perú (Lima); and/y Venezuela (Caracas)	TBD	IPv4	MEVA II Interconnection*/ Interconexión MEVA II REDDIG* REDDIG	2009	
Ecuador/Guayaquil	IP	Intra Regional	Colombia (Bogotá), Perú (Lima), and/y Venezuela (Caracas)	TBD	IPv4	REDDIG	2010	

Administration and Location/ Administración y Localidad	Type of Router / Tipo de Encaminador	Type of Interconnection/ Tipo de interconexión	Connected Router- Encaminador Conectado	Link Speed- Velocidad del enlace	Link Protocol- Protocolo del Enlace	Via Vía	Target Date / Fecha Meta	Remarks Observaciones
1	2	3	4	5		7	8	9
French Guiana/Cayenne Guyana Francesa/ Cayena	IP	Intra Regional	Brazil (Manaus), and/y Surinam (Paramaribo)	TBD	IPv4	REDDIG	2010	
Guyana/Georgetown	IP	Inter/Intra Regional	C-CAR (Piarco), Brazil (Manaos), Surinam(Paramaribo) and/y Venezuela(Caracas)	TBD	IPv4	REDDIG	2010	
Panamá/Panamá	IP	Inter/Intra Regional	NAM (Atlanta) Colombia (Bogota)	TBD	IPv4	MEVA II MEVA II Interconnection/ Interconexión MEVAII REDDIG	2010	
Paraguay/Asunción	IP	Intra Regional	Argentina (Buenos Aires), and/y Brazil (Brasilia)	TBD	IPv4	REDDIG	2008	
Perú/Lima	IP	Inter/Intra Regional	NAM(Atlanta), Argentina (Buenos Aires), Bolivia (La Paz), Brazil (Manaos), Chile(Santiago), Colombia (Bogotá), Ecuador (Guayaquil and/y Venezuela (Caracas)	TBD	IPv4	REDDIG	2009	
Suriname/Paramaribo	IP	Inter Regional	Brazil (Manaos), Guyana Francesa (Cayena) and/y Venezuela (Caracas)	TBD	IPv4	REDDIG	2010	
Uruguay/Montevideo	IP	Intra Regional	Argentina (Buenos Aires) and/y Brazil (Brasilia)	TBD	IPv4	REDDIG	2010	
Venezuela/Caracas	IP	Inter/Intra Regional	CAM (San Juan), EUR(Madrid), Brazil (Manaus), Colombia (Bogotá), Ecuador (Quito), Guyana (Georgetown), Suriname (Paramaribo) and/y Trinidad&Tobago (Piarco)	TBD	IPv4	MEVA II Interconnection/ Interconexión MEVAII REDDIG PTT REDDIG	2009	

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APPENDIX C / APÉNDICE C

TABLE CNS 1BB – ATN GROUND-GROUND APPLICATIONS PLAN / TABLA CNS1 B – PLAN DE APLICACIONES TIERRA-TIERRA ATN (CAR REGION / REGIÓN CAR)

ATN GROUND-GROUND APPLICATIONS PLAN / PLAN DE APLICACIONES TIERRA-TIERRA					
Administration and Location / Administración y localidad	**Application Type / Tipo de Aplicación**	**Connected with Administration & Location of / Conectada con Administración y Localidad de**	**Used Standard / Norma usada**	**Implementation Date / Fecha de Implementación**	**Remarks/ Observaciones**
1	**2**	**3**	**4**	**5**	**6**
ARUBA, Aruba	AMHS	FAA-Atlanta	IPS	TBD	
BAHAMAS, Nassau,	AMHS	FAA-Atlanta	IPS	TBD	
CAYMAN ISLANDS, Grand Cayman ISLAS CAIMANES , Gran Caimán	AMHS	FAA-Atlanta	IPS	TBD	
CUBA, Havana CUBA, La Habana	AMHS	FAA-Atlanta	IPS	2009	
	AIDC	TBD	TBD	TBD	
DOMINICAN REPUBLIC, Santo Domingo/ REPÚBLICA DOMINICANA, Santo Domingo	AMHS	FAA-Atlanta	IPS	2008	
	AIDC	TBD	TBD	TBD	
HAITI, Port-au-Prince/ HAITÍ, Puerto Príncipe	AMHS	FAA-Atlanta	IPS	2009	
HONDURAS, Tegucigalpa (COCESNA)	AMHS	FAA-Atlanta	IPS	2008	
	AIDC	TBD	TBD	TBD	
JAMAICA, Kingston	AMHS	FAA-Atlanta	IPS	2008	
	AIDC	TBD	IPS	TBD	
MEXICO, Mexico City MÉXICO, Ciudad de México	AMHS	FAA-Atlanta	IPS	TBD	
	AIDC	FAA- TBD	TBD	TBD	
	AIDC	TBD	TBD	TBD	

ATN GROUND-GROUND APPLICATIONS PLAN / PLAN DE APLICACIONES TIERRA-TIERRA					
Administration and Location / Administración y localidad	**Application Type / Tipo de Aplicación**	**Connected with Administration & Location of / Conectada con Administración y Localidad de**	**Used Standard / Norma usada**	**Implementation Date / Fecha de Implementación**	**Remarks/ Observaciones**
1	**2**	**3**	**4**	**5**	**6**
NETHERLANDS ANTILLES (Curacao) / ANTILLAS NEERLANDESAS (Curazao)	AMHS	FAA-Atlanta	IPS	TBD	
TRINIDAD AND TOBAGO, Piarco	AMHS	FAA-Atlanta	IPS	TBD	
	AIDC	TBD	TBD	TBD	
UNITED STATES, Atlanta ESTADOS UNIDOS, Atlanta	AMHS	Aruba	IPS	TBD	03 2007 - USA Availability to connect to the CAR/SAM Regions/ Disponibilidad de conectar con las Regiones CAR/SAM
	AMHS	Bahamas Nassau	IPS	TBD	
	AMHS	Cayman Islands, Grand Cayman Islas Caimanes , Gran Caimán	IPS	TBD	
	AMHS	Cuba, Havana Cuba, La Habana	IPS	2009	
	AMHS	Dominican Republic, Santo Domingo/ República Dominicana, Santo Domingo	IPS	2008	
	AMHS	Haiti, Port-au-Prince/ Haití, Puerto Príncipe	IPS	2008	
	AMHS	Honduras, Tegucigalpa (COCESNA)	IPS	2008	
	AMHS	Jamaica, Kingston	IPS	2008	
	AMHS	Mexico, Mexico	IPS	TBD	
	AMHS	Netherlands Antilles (Curacao) / Antillas Neerlandesas (Curazao)	IPS	TBD	
	AMHS	Panama, Panama City/ Panamá, Ciudad de Panamá	IPS	TBD	
	AMHS	Peru, Lima	IPS	TBD	

ATN GROUND-GROUND APPLICATIONS PLAN / PLAN DE APLICACIONES TIERRA-TIERRA					
Administration and Location / Administración y localidad	**Application Type / Tipo de Aplicación**	**Connected with Administration & Location of / Conectada con Administración y Localidad de**	**Used Standard / Norma usada**	**Implementation Date / Fecha de Implementación**	**Remarks/ Observaciones**
1	**2**	**3**	**4**	**5**	**6**
	AMHS	Trinidad and Tobago, Piarco	IPS	2009	
	AMHS	Venezuela, Maiquetía	IPS	2009	
UNITED STATES, TBD ESTADOS UNIDOS, Por determinar	AIDC	MEXICO, TBD	TBD	TBD	
	AIDC	TBD	TBD	TBD	

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APPENDIX D / APÉNDICE D

TABLE CNS 1BB –GROUND-GROUND APPLICATIONS PLAN / TABLA CNS1 BB – PLAN DE APLICACIONES TIERRA-TIERRA SAM REGION / REGIÓN SAM

ATN GROUND-GROUND APPLICATIONS PLAN / PLAN DE APLICACIONES TIERRA-TIERRA					
Administration and Location/ Administración y localidad	**Application Type/ Tipo de Aplicación**	**Conneted with Administration & Location of/ Conectada con Administración y Localidad de.**	**Used Standard / Norma usada**	**Implementation Date/ Fecha de Implementación**	**Remarks/ Observaciones**
1	2	3	4	5	6
Argentina, Buenos Aires	AMHS	Bolivia, Brazil, Chile, Paraguay Perú, Uruguay and/y AFI	IPS	2005	
	AIDC	Bolivia, Brazil, Chile, Paraguay Perú, Uruguay and/y AFI	IPS	TBD / Por determinar	
Bolivia , La Paz	AMHS	Argentina , Brazil and/y Perú	IPS	2010	
	AIDC	Argentina , Brazil and/y Perú	IPS	TBD / Por determinar	
Brazil, Brasilia	AMHS	Argentina, Bolivia, Paraguay, Uruguay, NAM, EUR, AFI	IPS	2008	
	AIDC	Argentina, Bolivia, Paraguay, Uruguay, NAM, EUR, AFI	IPS	TBD/ Por determinar	
Brazil, Manaus	AMHS	Colombia, Guyana, Guyana Francesa, Peru, Surinam and/y Venezuela	IPS	2008	
	AIDC	Colombia, Guyana, Guyana Francesa, Perú Surinam and/y Venezuela	IPS	TBD/ Por determinar	
Chile, Santiago	AMHS	Argentina, Perú and/y PAC	IPS	2009	
	AIDC	Argentina, Perú and/y PAC	IPS	TBD/ Por determinar	
Colombia , Bogotá	AMHS	Brazil, Ecuador, Perú and/y Venezuela	IPS	2008	
	AIDC	Brazil, Ecuador, Perú and/y Venezuela	IPS	TBD/ Por determinar	
Ecuador ,Quito	AMHS	Colombia, Perú and/y Venezuela	IPS	2009	
	AIDC	Colombia, Perú and/y Venezuela	IPS	TBD/ Por determinar	
French Guiana,, Cayenne Guyana Francesa, Cayena	AMHS	Brazil, Surinam and/y Venezuela	IPS	2009	
	AIDC	Brazil, Surinam and/y Venezuela	IPS	TBD/ Por determinar	
Guyana, Georgetown	AMHS	Brazil, Trinidad Tobago and/y Venezuela	IPS	2009	
	AIDC	Brazil, Trinidad Tobago and/y Venezuela	IPS	TBD/ Por determinar	
Panamá, Panamá	AMHS	Colombia, NAM	IPS	2008	
	AIDC	Colombia, NAM	IPS	TBD/ Por determinar	
Paraguay, Asunción	AMHS	Argentina, Brazil	IPS	2007	
	AIDC	Argentina, Brazil	IPS	TBD/ Por determinar	
Perú, Lima	AMHS	Argentina, Bolivia, Brazil, Chile Colombia, Ecuador, Venezuela and/y NAM	IPS	2007	
	AIDC	Argentina, Bolivia, Brazil, Chile Colombia, Ecuador Venezuela and/y NAM	IPS	TBD/ Por determinar	
Suriname, Paramaribo	AMHS	Brazil, French Guyana and/y Venezuela	IPS	2009	
	AIDC	Brazil, French Guyana and/y Venezuela	IPS	TBD/ Por determinar	

ATN GROUND-GROUND APPLICATIONS PLAN / PLAN DE APLICACIONES TIERRA-TIERRA					
Administration and Location/ Administración y localidad	**Application Type/ Tipo de Aplicación**	**Conneted with Administration & Location of/ Conectada con Administración y Localidad de.**	**Used Standard / Norma usada**	**Implementation Date/ Fecha de Implementación**	**Remarks/ Observaciones**
1	2	3	4	5	6
Uruguay, Montevideo	AMHS	Argentina, Brazil	IPS	2008	
	AIDC	Argentina, Brazil	IPS	TBD/ Por determinar	
Venezuela, Caracas	AMHS	Brazil, Colombia, Ecuador, Guyana, Guyana Francesa , Perú, Suriname, NAM, CAR and/y EUR	IPS	2008	
	AIDC	Brazil, Colombia, Ecuador Guyana, Guyana Francesa , Perú, Suriname, NAM, CAR and/y EUR	IPS	TBD/ Por determinar	

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APPENDIX E

IP ADDRESS PLAN (IPv4)

The IP address structure (Private IPv4) to be adopted in the CAR/SAM Region was the following:

1st BYTE	2nd BYTE		3th BYTE		4th BYTE
8 bits	4 bits	4 bits	4 bits	4 bits	8 bits
00001010	Region	State		Host	

The structure has as a first byte the fixed value of 10 in decimal number
The rest of 24 bits (3 bytes) have the following distribution, part of the 2nd byte should be used for identification of Regions; and part of the 3rd bytes should be used for State identification. The 4th and part of the 3rd byte should be used for hosts

The address structure has the following codification :

10.XXXX YYYY.YYYYZZZZ.ZZZZZZZZ
Sub mask 255.255.240.0
X= Region (16 regions allowed)
Y= States/Territories (256 States /Territories allowed)
Z= host (4096 hosts allowed)

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APPENDIX F / APENDICE F

AMHS MD REGISTER FOR CAR/NAM REGIONS / REGISTRO AMHS MD PARA LAS REGIONES CAR/NAM

http://www.icao.int/anb/panels/acp/amhs

STATE / ESTADO		AMHS ADDRESS SPECIFICATION /					
NATIONALITY LETTERS / LETRAS NACIONALIDAD	NAME / NOMBRE	STATE NAME / NOMBRE ESTADO (C)	ADMD NAME / NOMBRE ADMD (A)	PRMD NAME / NOMBRE PRMD (P)	ADDRESSING SCHEME / ESQUEMA DE DIRECCIONAMIENTO	ORGANIZATION NAME / NOMBRE ORGANIZACIÓN (O)	REMARKS/ OBSERVACIONES
TQ	Anguilla (U.K.)	XX	ICAO	TQ	XF	AFTN	
TA	Antigua and Barbuda	XX	ICAO	TA	XF	AFTN	
TB	Barbados	XX	ICAO	TB	CAAS	AFTN	State letter confirmed/Carta confirmación Estado
TU	British Virgin Islands (U.K.)	XX	ICAO	TU	XF	AFTN	
TF	French Antilles	XX	ICAO	TF	XF	AFTN	State letter confirmed/Carta confirmación Estado
TG	Grenada	XX	ICAO	TG	XF	AFTN	
TR	Montserrat (U.K.)	XX	ICAO	TR	XF	AFTN	
TK	Saint Kitts and Nevis	XX	ICAO	TK	XF	AFTN	
TL	Saint Lucia	XX	ICAO	TL	XF	AFTN	
TD	Dominica	XX	ICAO	TD	XF	AFTN	
TV	Saint Vincent and the Grenadines	XX	ICAO	TV	XF	AFTN	
TT	Trinidad and Tobago	XX	ICAO	TT	XF	AFTN	
TN	Netherlands Antilles	XX	ICAO	TN	XF	AFTN	
TNCA	Aruba	XX	ICAO	TNCA	XF	AFTN	
MY	Bahamas	XX	ICAO	MY	XF	AFTN	
MU	Cuba	XX	ICAO	MU	CAAS	MU	State letter confirmed/Carta confirmación Estado
MT	Haiti	XX	ICAO	MT	XF	AFTN	
MW	Cayman Islands (U.K.)	XX	ICAO	MW	XF	AFTN	
MB	Turks and Caicos Islands (U.K.)	XX	ICAO	MB	XF	AFTN	
MK	Jamaica	XX	ICAO	MK	XF	AFTN	
MD	Dominican Republic	XX	ICAO	MD	XF	AFTN	
TI	Virgin Islands (U.S.)	XX	ICAO	TI	XF	AFTN	

STATE / ESTADO		AMHS ADDRESS SPECIFICATION /					
NATIONALITY LETTERS / LETRAS NACIONALIDAD	**NAME / NOMBRE**	**STATE NAME / NOMBRE ESTADO (C)**	**ADMD NAME / NOMBRE ADMD (A)**	**PRMD NAME / NOMBRE PRMD (P)**	**ADDRESSING SCHEME / ESQUEMA DE DIRECCIONAMIENTO**	**ORGANIZATION NAME / NOMBRE ORGANIZACIÓN (O)**	**REMARKS/ OBSERVACIONES**
MZ	Belize	XX	ICAO	MZ	XF	AFTN	
MR	Costa Rica	XX	ICAO	MR	XF	AFTN	
MS	El Salvador	XX	ICAO	MS	XF	AFTN	
MG	Guatemala	XX	ICAO	MG	XF	AFTN	
MH	Honduras	XX	ICAO	MH	XF	AFTN	
MN	Nicaragua	XX	ICAO	MN	XF	AFTN	
MM	Mexico	XX	ICAO	MM	CAAS	MM	State letter confirmed/Carta confirmación Estado
TX	Bermuda (U.K.)	XX	ICAO	TX	XF	AFTN	
TJ	Puerto Rico	XX	ICAO	TJ	XF	AFTN	
C*	Canada	XX	ICAO	C	XF	AFTN	
K*	United States	XX	ICAO	USA	CAAS		State letter confirmed/Carta confirmación Estado

Date/Fecha: 25 March 2008 / 25 de marzo de 2008

PROPOSED AMHS MD REGISTER FOR SAM REGION / REGISTRO AMHS MD PARA LAS REGIONES SAM PROPUESTO

STATE/ ESTADO	AMHS ADDRESSING SPECIFICATIONS / ESPECIFICACIONES DE DIRECCIONAMIENTO AMHS					
	STATE NAME/ NOMBRE ESTADO (C)	ADMD NAME/ NOMBRE ADMD (A)	PROMD NAME/ NOMBRE PRMD (P)	ORGANIZATION NAME/ NOMBRE ORGANIZACIÓN (O)	ORGANIZATIONAL UNIT NAME/ NOMBRE UNIDAD ORGANIZACIONAL (OUI)	COMMON NAME/ NOMBRE COMUN (CN)
ARGENTINA	XX	ICAO	ARGENTINA	SAEZ	Todas las cuatro letras indicadas en el Documento 7910 de la OACI	User AFTN address (8 letter)/ Dirección AFTN (8 letras) de usuario
BOLIVIA	XX	ICAO	BOLIVIA	SLLF	Id	Id
BRAZIL	XX	ICAO	BRASIL	SBBF	Id	Id
CHILE	XX	ICAO	CHILE	SCEZ	Id	Id
COLOMBIA	XX	ICAO	COLOMBIA	SKED	Id	Id
ECUADOR	XX	ICAO	ECUADOR	SEGU	Id	Id
FRENCH GUIANA/GUYANA FRANCESA	XX	ICAO	GUYANA FRANCESA	SOCA	Id	Id
GUYANA	XX	ICAO	GUYANA	SYCJ	Id	Id
PANAMA	XX	ICAO	PANAMA	MPTO	Id	Id
PARAGUAY	XX	ICAO	PARAGUAY	SGAS	Id	Id
PERU	XX	ICAO	PERU	SPLI	Id	Id
SURINAME	XX	ICAO	SURINAME	SMPM	Id	Id
URUGUAY	XX	ICAO	URUGUAY	SUEO	Id	Id
VENEZUELA	XX	ICAO	VENEZUELA	SVZM	Id	Id

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APPENDIX G / APÉNDICE G

TABLE CNS 3 / TABLA CNS 3

TABLE OF RADIO NAVIGATION AIDS / TABLA DE AYUDAS PARA LA RADIONAVEGACIÓN

EXPLANATION OF THE TABLE

Column

1 Name of the country, city and aerodrome and, for route aids, the location of the installation.

2 The designator number and runway type:

NINST Visual flight runway
NPA Non precision approach runway
PA1 Precision approach runway, Category I
PA2 Precision approach runway, Category II
PA3 Precision approach runway, Category III

3 The functions carried out by the aids appear in columns 4 to 8 and 10 to 12.

A/L Approach and landing
T Terminal
E En route

4 ILS Instrument landing system. Roman numerals I, II and III indicate the acting category of the ILS I, II or III. (I) indicates that the facility is implemented.

The letter “D” indicates a DME requirement to serve as a substitute for a marker beacon component of an ILS.

Note. Indication of the category refers to the performance standard to be achieved and maintained, in accordance with pertinent specifications in ICAO Annex 10, and not to specifications of the ILS equipment, since both specifications are not necessarily the same.

An asterisk (*) indicates that the ILS requires a Category II signal, but without the reliability and availability which redundant equipment and automatic switching provide.

5 Radio beacon localizer, be it associated with an ILS or to be used as an approach aid at an aerodrome.

6 Radiotelemetrical equipment. When an “X” appears in column 6 in line with the VOR in column 7, this indicates the need that the DME be installed at a common site with the VOR.

7 VOR VHF omnidirectional radio range.

8 NDB Non-directional radio beacon.

9 The distances and altitude to which the VOR or VOR/DME signals are required, indicated in nautical miles (NM) or thousands of feet, or the nominal coverage recommended of the NDB, indicated in nautical miles.

10, 11, 12 GNSS global navigation satellite system (includes ABAS, GBAS and SBAS).

ABAS (aircraft based augmentation system) implementation planned to be used for route navigation, for terminal and for non precision approach. Filling this column indicates when navigation services are allowed through the single use of, GPS + RAIM or GPS +RAIM with any other onboard supporting equipment.

GBAS (ground-based augmentation system) implementation planned to be used in precision approach and landing CAT I, CAT II, CAT III.

SBAS (satellite-based augmentation system) implementation planned to be used for route navigation, for terminal, for non precision approach, non precision approach with vertical guidance and landing. An “X” indicates service availability; exact location of installation will be determined.

13 Remarks

Note. Columns 5 to 12 use the following symbols:

D DME required but not implemented.
DI DME required and implemented.
X Required but not implemented.
XI Required and implemented.

EXPLICACIÓN DE LA TABLA

Columna

1 Nombre del país, ciudad y aeródromo y, para las ayudas en ruta, el emplazamiento de la instalación.

2 Número de designador y tipo de pista:

NINST Pista de vuelo visual
NPA Pista de aproximación que no es de precisión
PA1 Pista de aproximación de precisión, Categoría I
PA2 Pista de aproximación de precisión, Categoría II
PA3 Pista de aproximación de precisión, Categoría III

3 La función efectuada por las ayudas figura en las Columnas 4 a 8 y 10 a 12.

A/L Aproximación y aterrizaje
T Terminal
E En ruta

4 ILS Sistema de aterrizaje por instrumentos. Los números romanos I, II y III indican la categoría de actuación del ILS, I, II o III. (I) indican que la instalación está en servicio.

La letra “D” indica que se requiere un DME para sustituir a un componente de radiobaliza de un ILS.

Nota. La indicación de la categoría se refiere a la norma de performance que ha de alcanzarse y mantenerse, de conformidad con las especificaciones pertinentes del Anexo 10 de la OACI, y no con las especificaciones del equipo ILS, ya que ambas especificaciones no son necesariamente las mismas.

Un asterisco (*) indica que el ILS requiere una señal de Categoría II, pero sin la fiabilidad y disponibilidad que proporcionan el equipo de reserva y la conmutación automática.

5 Localizador de radiofaro, asociado a un ILS o para utilizarlo como ayuda de aproximación en un aeródromo.

6 Equipo radiotelemétrico. Cuando figura una AX@ en la Columna 6 junto con el VOR de la Columna 7, quiere decir que el DME debe instalarse en un sitio común con el VOR.

7 VOR Radiofaro omnidireccional en VHF.

8 NDB Radiofaro no direccional.

9 Las distancias y altitud a las cuales se requieren señales VOR o VOR/DME indicadas en millas marinas (NM) o miles de pies, o la cobertura nominal recomendada del NDB indicada en millas marinas.

10, 11, 12 GNSS sistema mundial de navegación por satélite (incluye ABAS, GBAS y SBAS).

ABAS (sistema de aumentación basado en aeronave) según lo previsto, se utilizará en navegación en ruta, terminal, y aproximaciones que no son de precisión. Llenando esta columna indica cuando los servicios de navegación son permitidos a través del uso del GPS + RAIM o GPS + RAIM con cualquier otro sistema de apoyo abordo.

GBAS (sistema de aumentación basado en tierra) según lo previsto se utilizará en las aproximaciones y aterrizajes de precisión de CAT I, CAT II y CAT III.

SBAS (sistema de aumentación basado en satélites) según lo previsto, se utilizará en navegación en ruta, terminal, aproximaciones de no precisión con guiado vertical y aterrizajes que no son de precisión. La X indica disponibilidad de servicio; se determinará el emplazamiento exacto de la instalación.

13 Observaciones

Nota. En las Columnas 5 a 12 se utilizan los símbolos siguientes:

D DME requerido pero no en servicio.
DI DME requerido y en servicio.
X Requerido pero no en servicio.
XI Requerido y en servicio.

TABLE CNS 3 / TABLA CNS 3

TABLE OF RADIO NAVIGATION AIDS / TABLA DE AYUDAS PARA LA RADIONAVEGACIÓN

Station/Territory Estación/Territorio	Rwy type Tipo de pista	Function Función	ILS	L	DME	VOR	NDB	Coverage Cobertura	GNSS			Remarks Observaciones
									ABAS	GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12	13

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APÉNDICE H / APENDICE H

REGIONAL DEACTIVATION PLAN OF NDB STATIONS

PLAN REGIONAL PARA DESACTIVACION DE ESTACIONES NDB

CAR REGION/ REGION CAR

Update: 22 September 2008 / 22 septiembre 2008

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
ANGUILLA (United Kingdom) THE VALLEY WALL BLAKE, Anguilla I.	ANG	A/E	2018	NACC/WG/01 Conclusion 1/8
ANTIGUA AND BARBUDA SAINT JOHNS/V.C. Bird, Antigua I.	ANU	A/E	2018	NACC/WG/01 Conclusion 1/8
	ZDX	A/E	2018	NACC/WG/01 Conclusion 1/8
BAHAMAS ALICE TOWN/South Bimini, Bimini I.	ZBB	E	?	
FREEPORT/Intl, Grand Bahama I.	ZFP	AE	?	
GEORGE TOWN/EXUMA Intl,	ZGT	A/L	?	
NASSAU/Intl, New Providence I.	ZQA	AE	?	
BARBADOS				
BRIDGETOWN/Grantley Adams Intl.	BGI	A/E	2005	It will remain serviceable until maintenance support becomes exhaustive. No later than 2018 / Permanecerá en servicio hasta que mantenimiento sea exhaustivo. No más allá de 2018.
BELIZE				
BELIZE/Intl.	BZE	AE	?	
CAYMAN ISLANDS				
CAYMAN BRAC/Gerrard Smith Intl.	CBC	AE	?	
GEORGETOWN/Owen Roberts Intl.	ZIY	AE	?	

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
COSTA RICA				.
COTO 47	COT	AE	?	
LOS CHILES	CHI	E	?	
HORCONES	HOR	AE	?	
PARRITA	PAR	E	?	
CUBA				
CAYABO	UCY	T, E	2010 - 2015	
CAYO LARGO DEL SUR/Vilo Acuña Intl.	UCL	AE	2015 - 2020	
CIEGO DE AVILA/Maximo Gomez Intl.	UCV	A	2015 - 2020	
HOLGUIN/Frank Pais Intl.	UHG	AE	After/Posterior 2020	
NUEVA GERONA	UNG	AE	2015 - 2020	
SANTIAGO DE CUBA/Antonio Maceo	UCU	AE	2015 - 2020	
DOMINICAN REPUBLIC				
BARAHONA/María Montés Intl.	BHN	AE	-	Decomissioned / Desmantelado
HERRERA/Herrera Intl.	HER	AE	-	Decomissioned / Desmantelado
LA ROMANA/La Romana Intl.	LRN	AE	?	
PUERTO PLATA/Gregorio Luperon Intl.	PPA	AE	?	
PUNTA CANA/Punta Cana Intl.	PCA	AE	?	
PUNTA CAUCEDO/SANTO DOMINGO/De las Américas Intl.	HIJ	AE	-	Decomissioned / Desmantelado
GUERRA	LAS	AE	?	Decomissioned / Desmantelado
Higuero	HGR	AE	?	
EL SALVADOR				
SAN SALVADOR/El Salvador Intl.	LAN	A	?	
SAN SALVADOR/Ilopango Intl.	YSX	A	?	
FRENCH ANTILLES (France)				
FORT DE FRANCE/Le Lamentin, Martinique	FXF	AE	2018	NACC/WG/01 Conclusion 1/8
FORT DE FRANCE/Le Lamentin,	FOF	AE	2018	NACC/WG/01 Conclusion 1/8

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
Martinique				
POINTE-A PITRE/Le Raizet, Guadeloupe	PTP	A	2018	NACC/WG/01 Conclusion 1/8
GRENADA				
SAINT GEORGES/Point Salines	GND	AE	2018	NACC/WG/01 Conclusion 1/8
GUATEMALA				
Mundo Maya/Flores Intl.	TIK	AE	Mar 2011	
GUATEMALA/La Aurora	GUA	T	Jan 2009	
IZTAPA	IZP	A	?	
PUERTO BARRIOS/Puerto Barrios	BAR	AE	Dec 2010	
RABINAL	RBN	E	?	
HAITI				
Port-Au-Prince/Port-Au-Prince Intl.	HHP	AE	-	Decomissioned / Desmantelado
HONDURAS				
COPAN RUINAS	RUI	E	?	
LA CEIBA/Golosón Intl.	LCE	AE	?	
Coxen Hole/ROATAN	ROA	A	?	
SAN PEDRO SULA/La Mesa Intl.	SAP	A	?	
TEGUCIGALPA/Toncontín Intl.	TGU	AE	-	Decomissioned / Desmantelado: COCESNA
	TNT	AE	-	Decomissioned / Desmantelado: COCESNA
PUNTA CASTILLA	CTL	AE	?	
PUERTO LEMPIRA	PLP	E	?	
PICACHO/Tegucigalpa	PIC	E	2008	Decomissioned / Desmantelado: AIP Honduras
JAMAICA				
KINGSTON/Norman Manley Intl.	KIN	AE	20 Nov 06	CAD letter / Carta DGAC: 04 Apr 08
MONTEGO BAY/Sangster Intl.	MBJ	AE	13 Mar 08	CAD letter / Carta DGAC: 04 Apr 08

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
MEXICO				
ACAPULCO/Gral. Juan N. Alvarez Intl.	SMS	E	?	
CHETUMAL/Chetumal Intl.	CTM	A	?	
CHIHUAHUA/Gral. Roberto Fierro Villalobos Intl.	CUW	AE	?	
CHOIX	CHX	E	?	
COZUMEL/Cozumel Intl.	CZL	AE	?	
GUAYMAS/Gral. José Maria Yañez Intl.	GYM	AE	?	
LOS MOCHIS			?	Reccomended / Recomendado
MERIDA/Lic. Manuel Crescencio Rejón Intl. (PROGRESO)	MPG	E	?	
MEXICO/Lic. Benito Juárez Intl.	MW	A	?	
SAN MARCOS	SMC	A	?	
SANTA ANITA		A	?	Reccomended / Recomendado
TAMPICO/Gral. Francisco Javier Mina Intl.	TAM	A	?	
TEPIC		E	?	In project / Proyectado
MONTSERRAT (United Kingdom)				
PLYMOUTH/W.H. Bramble, Montserrat I.	MON	A/L	2018	NACC/WG/01Conclusion 1/8
NETHERLANDS ANTILLES (Netherlands)				
PHILIPSBURG/Prinses Juliana, St. Maarten I.	PJM	AE	?	
WILLEMSTAD/Hato, Curacao I.	PJG	AE	?	
NICARAGUA				
MANAGUA/Augusto César Sandino Intl.	YNP	AE	30 Jun 2007	
PUERTO RICO (United States)				
DORADO	DDP	AE	?	
MAYAQUEZ/Mayaquez	MAZ	A	?	
POINT TUNA	X	E	?	
ROOSEVELT ROADS	NRR	T	?	

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
SAN JUAN DE PUERTO RICO/Luis Muñoz Marín Intl.	L	A	?	
SAN PAT		T	?	
Saint Kitts and Nevis				
Basseterre/ Robert L. BradShaw, St. Kitts Is.	SKB	AE	2018	NACC/WG/01Conclusion 1/8
SAINT LUCIA				
CASTRIES/George F. Charles	SLU	AE	2018	NACC/WG/01Conclusion 1/8
VIEUXFORT/Hewanorra Intl.	BNE	AE	2018	NACC/WG/01Conclusion 1/8
SAINT VINCENT AND THE GRENADINES				
CANOUAN/Canouan Is.	CAI	A	2018	NACC/WG/01Conclusion 1/8
KINGSTOWN/E.T. Joshua	SV	AE	?	NACC/WG/01Conclusion 1/8
MUSTIQUE/ Mustique Intl.				In Project / Proyectado
TRINIDAD AND TOBAGO				
PORT OF SPAIN/Piarco Intl. Trinidad I.	TRI	AE	2018	NACC/WG/01Conclusion 1/8
PIARCO APP/ Galeota	GAL	A	2018	NACC/WG/01Conclusion 1/8
SCARBOROUGH/Crown Point, Tobago I.	TAB	AE	2018	NACC/WG/01Conclusion 1/8
TURKS AND CAICOS ISLANDS (United Kingdom)				
GRAND TURK/Grand Turk Intl.	GT	A	?	
PROVIDENCIALES/Providenciales Intl.	PV	AE	?	
SOUTH CAICOS/South Caicos Intl.	SC	A	?	
VIRGIN ISLANDS (United Kingdom)				
ROADTOWN/Terrance B. Lettsome, Tortola I.	BFI	AE	2018	NACC/WG/01Conclusion 1/8
VIRGIN ISLANDS (United States)				
CHRISTIANSTED/Henry E. Rohlsen,	SX	A	2018	NACC/WG/01Conclusion 1/8

SAM REGION / REGION SAM

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
ARGENTINA				
COMODORO RIVADAVIA/Gral. Mosconi		E		
CORDOBA/Ing. Aer. A. L. Taravella		A/L/T/E	2008	
FORMOSA/Formosa		A/L/T		
GENERAL PICO		E		
JUJUY/Jujuy		A/L/E	2008	
JUNIN		E		
LA PLATA		E		
MALARGUE		E		
MAR DE PLATA/Brig. Gral. B. de la Colina		A/L/T/E		
MENDOZA/El Plumerillo		A/L/T		
NEUQUEN/Presidente Peron		E		
ORAN		E	2008	
POSADAS/Libertador Gral. D. José de San Martín		A/L		
RESISTENCIA/Resistencia		A/L/E		
RIO GALLEGOS/Piloto Civil N. Fernández		A/L/E	2008	
RIO GRANDE/Rio Grande		A/L/E		
SALTA/Salta		A/L		
SAN ANTONIO DE ARECO		E		
SAN CARLOS DE BARILOCHE/San Carlos de Bariloche		A/L/E		
SAN JUAN		E		
TUCUMAN/Tte. Benjamín Matienzo		A/L		
BOLIVIA				
CHARAÑA		E	2017	
COCHABAMBA/Jorge Wilsterman		E	2017	
LA PAZ/El Atlo Intl.		A/L/T/E	2017	
RIBERALTA		E	2017	
ROBORE		E	2017	
SANTA ANA		E	2017	
SANTA CRUZ/Viru Viru		A/L/E	2017	
SUCRE		E	2017	
TARIJA/Oriel Lea Plaza		E	2017	

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
TRINIDAD/Tte. Av. Jorge Henrich Arauz		A/L/E	2017	
YACUIBA		E	2017	
BRAZIL				
ABROLHOS		E		
ALDEIA		T/E		
ALTA FLORESTA	ATF	E	Jan 2012	245Khz
AMAPA	AMP	E	Jan 2019	275Khz
ARACAJU	ACJ	E	Jan 2012	335Khz
BAGE	BGE	E	Jan 2012	235Khz
BARREIRAS	BRR	E	Jan 2012	375Khz
BAURU	BRU	E	Jan 2019	380Khz
BELEM/Val De Caes	BEL	A/L/E	Jan 2012	250Khz
BELO HORIZONTE/Tancredo Neves Intl.	BHZ	A/L/T/E	Jan 2012	520Khz
BOA VISTA/Boa Vista Intl.	BVI	A/L/E	Jan 2012	405Khz
BRASILIA/Brasilia Intl.	BRS	T/E	Jan 2012	340Khz
CAMPO GRANDE/Campo Grande Intl.	IG	A/L/T/E	Jan 2019	395Khz
	CGR		Jan 2019	270Khz
CAMPOS		E		
CARAJÁS		E		
CARAUARI	CUA	E	Jan 2019	285Khz
CARAVELAS	CVL	E	Jan 2012	365Khz
CAROLINA	CNA	E	Jan 2012	330Khz
CAXIAS	CXS	T	Jan 2012	1690Khz
CORUMBÁ/Corumbá Intl.	CUB	A/L/T/E	Jan 2019	375Khz
CRUZEIRO DO SUL/Cruzeiro do Sul Intl.	CZS	A/L/E	Jan 2012	260Khz
CUIABÁ/Marechal Rondom	CIA	A/L/T/E	Jan 2012	380Khz
CURITIBA/Afonso Pena Intl.	PNH	A/L/T/E	Jan 2012	255Khz
FLORIANÓPOLIS/ Hercílio Luz Intl.	BKO	A/L/E	Jan 2019	380Khz
	IL		Jan 2019	350Khz
FORTALEZA/ Pinto Martins	PCI	A/L/E	Jan 2019	210Khz
FOZ DO IGUACU/Cataratas Intl.	QQ	A/L	Jan 2019	395Khz
GABRIEL		E		
GUAJARÁ		E		
ILHEUS	YLH	E	Jan 2019	305 Khz
ITACOATIARA	YTC	E	Jan 2019	320 Khz
JACAREACANGA	JAC	E	Jan 2012	360Khz
LAGES	LJS	E	Jan 2019	240Khz
LAPA		E		
LUZIANIA	LVZ	T	Jan 2012	400Khz
MACAPA/Macapa Intl.	MCP	A/L/E	Jan 2012	215Khz

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
MACEIO	MCO	E	Jan 2012	340Khz
MANAUS/Eduardo Gomes Intl.	PEL	A/L/T	Jan 2062	410Khz
MONTES CLAROS		E		
MOSSORO	MSS	E	Jan 2012	275 Khz
MOZ		E		
NATAL/Augusto Severo Intl.	MXN	A/L/E	Jan 2016	205 Khz
PALMAS	PMS	E	Jan 2012	255 Khz
PARANAGUA	PNG	E	Jan 2019	340 Khz
PARNAIBA	PNB	E	Jan 2019	365 Khz
PAULO AFONSO	PAF	E	Jan 2012	325 Khz
PELOTAS	PTS	E	Jan 2012	340 Khz
PETROLINA	PTL	E	Jan 2012	345 Khz
PIRAI		E		
POCOS	PCL	E	Jan 2019	415 Khz
PONTA PORA/Ponta Pora Intl.		A/L/E		
PORTO ALEGRE/Salgado Filho Intl.	PA	T/E	Jan 2012	315 Khz
	PAG		Jan 2012	330 KhZ
RECIFE /Guararapes	VSA	A/L/E	Jan 2012	285 Khz
RIO BRANCO	RBC	E	Jan 2012	355 Khz
RIO DE JANEIRO/Galeão Antônio Carlos Jobim Intl.	YLA	A/L	Jan 2014	330 Khz
RONDONIA		E		
SALVADOR/Deputado Luis Eduardo Magalhaes	SVD	A/L/T	Jan 2012	275 Khz
SANTAREM/Santarem Intl.	STM	A/L/T/E	Jan 2012	350 Khz
SAO LUIS/ Marechal Cunha Machado	SLI	A/L/T/E	Jan 2012	280 Khz
TABATINGA/Tabatinga Intl.		A/L/T		
TEFE	TFE	E	Jan 2012	300 Khz
UBERABA		E		
URUBUPUNGA	URP	E	Jan 2012	335 Khz
URUBURETAMA	URT	E	Jan 2014	235 Khz
URUGUAIANA/ Rubem Berta Intl.		A/L/T		
CHILE				
ARICA/Chaculluta		A/L		
BALMACEDA	BAL	E	Dec 2018	390 Khz
CALAMA	CFL	E	Dec 2018	215 Khz
CALDERA	CLD	E	Under study / En estudio	227 Khz
CHAITEN	TEN	E	Dec 2018	234 Khz
CHILLAN	CHI	E	Dec 2012	411 Khz
CONCEPCION/Carriel Sur	CE	T/E	Dec 2018	254 Khz
CURICO	ICO	E	Dec 2008	270 Khz

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
ISLA REY JORGE	IRJ	E	Under study / En estudio	360 Khz
IQUIQUE/Gral. Diego Aracena	R	A/L	Under study/ En estudio	368 Khz
PUERTO AGUIRRE	PAR	E		Decomissioned / Desmantelado
PUERTO MONTT/El Tepual	MO	E	Dec 2008	325 Khz
PUNTA ARENAS/Presidente Cabo Ibañez del Campo	NAS	T/E	Under study / En estudio	270 Khz
SANTIAGO/Arturo Merino Benitez	UE	E	Dec 2019	220 Khz
SANTO DOMINGO	SNO	E	Under study / En estudio	355 Khz
TABON	TBN	E		Decomissioned / Desmantelado
TONGOY	TOY	E	Under study / En estudio	260 Khz
COLOMBIA				
ABEJORRAL		E		
AMBALEMA		E		
BARRANCA BERMEJA		E		
BARRANQUILLA/Ernesto Cortissoz		A/L/E		
SANTAFE DE BOGOTA/Eldorado		A/L/T/E		
BUCARAMANGA		E		
BUENAVENTURA	BUN	E	2005	Replaced by VOR/DME Reemplazado por VOR/DME
CALI/Alfonso Bonilla Aragón	CLO	T/E	2008	Replaced by VOR/DME Reemplazado por VOR/DME
CARTAGENA/Rafael Nuñez		A/L		
LETICIA/Alfredo Vasquez Cobo	LET	A/L/E	2009-2018	
MERCADERES	MER	E	1997	Replaced by VOR/DME Reemplazado por VOR/DME
MITU		E		
PEREIRA		E		
RIO HACHA		E		
SAN ANDRES /Gustavo Rojas Pinilla		A/L/T/E		
SAN JOSE DEL GUAVIARE		E		
TECHO	TEH	E	2006	Replaced by VOR/DME Reemplazado por VOR/DME
TULUA		E		
TUMACO	TCO	E	2007	Replaced by VOR/DME Reemplazado por VOR/DME
VILLAVICENCIO		E		
ZIPAQUIRA		E		

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
ECUADOR				
AZCAZUBI		T		
CHONGON		T		
CUENCA		E		
ESMERALDAS		E		
LATACUNGA/Cotopaxi Intl		A/L		
PALMA		T		
FRENCH GUIANA (France)				
CAYENNE/Rochambeau		A/L/E		
GUYANA				
TIMEHRI/Cheddi Japan Intl.		A/L/E		Decomissioned / Desmantelado
KATA		T/E		Decomissioned / Desmantelado
PANAMA				
DAVID/Enrique Malek	DAV	A/L	Dec 2010	
PANAMA/Tocumen Intl.	NAT	A/L	Dec 2012	
TABOGA	TBG	E	Dec 2009	
WANNKANDI		E		
PARAGUAY				
ASUNCION/Silvio Pettirossi		A/L/E		
CONCEPCION		E		
ESTIGARRIBIA		E		
FILADELFIA		E		
PERU				
AYACUCHO	AYA	E	2011	
CAJAMARCA	MAR	E	2011	
PISCO/Pisco		T		Decommissioned / Desmantelado
TARAPOTO		E		Decomissioned / Desmantelado
SURINAME				
PARAMARIBO/Zorg En Hoop				Decomissioned / Desmantelado
ZANDERY/Johan Adolfo Pengel Intl.		A/L/E		Decomissioned / Desmantelado

Administration/Location Administración/ Lugar	Identification/ Identificación	Function/ Función	Deactivation Date/ Fecha de desactivación	Remarks/ Observaciones
1	2	3	4	5
URUGUAY				
COLONIA/Internacional de Colonia		A/L		
MALDONADO/Intl C/C Calos A. Curbelo Laguna del Sauce		A/L		
MONTEVIDEO/Aeropuerto Angel S. Adami Intl.		A/L		
MONTEVIDEO/Carrasco Intl.		A/L/T/E		
RIVERA/Cerro Chapeu Intl.		A/L		
SALTO/Nueva Hesperides Intl.		A/L/E		
VENEZUELA				
CABO CODERA		E		
CARACAS/Simon Bolivar Intl., Maiquetia		A/L/E		
CARUPANO		E		
ELORZA		E		
GRAND ROQUE		E		
LA DIVINA PASTORA		E		
MARACAIBO/La Chinita Intl.		A/L/E		
MARGARITA I./ Intl. Del Caribe, Gral. Santiago Marino		A/L/E		
TUCUPITA		E		
VALENCIA/Zim Valencia Intl.		A/L		

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APPENDIX I

UNIFIED REGIONAL SURVEILLANCE STRATEGY
CAR/SAM REGION

Table of Contents

SURVEILLANCE STRATEGY FOR CAR/SAM REGION

1. Introduction

1.1. General considerations

1.1.1 This initial document is the result of the task assigned to CNS Committee - CNS/SUR/TF from GREPECAS 14 Meeting in which the Preliminary elements for a Regional Surveillance Strategy and the Regional CAR/SAM Strategy for short, medium and long term ADS-C and ADS-B use have been integrated into a Unified Regional Strategy for the Implementation of Surveillance Systems. This is a live document based on the Global and Regional Planning:

a) The Global Strategies are described on Doc 9750 Global Air Navigation Plan on its initiatives:
   - GPI-09 Situational Awareness: promotes the operational implementation of data link surveillance, and the definition of the use of ADS-B and ADS-C.
   - GPI-17 Data link Applications promotes the use of data link applications, and its harmonization for seamless and interoperable operations.

b) The CAR/SAM Regional Implementation of Surveillance Systems: Doc. 8733 "CAR/SAM Regional Air Navigation Plan" CNS Table 4A Surveillance System Regional Plan.

1.1.2 The main objective of this strategy is to propose the surveillance systems that are suitable to be applied in short and medium terms within the CAR/SAM Regions and to define an evolutionary path that will promote safety, interoperability and cost effectiveness of the required infrastructure to meet the future ATM needs.

1.1.3 The surveillance strategy should be seen as a guidance document to all stakeholders, without any regulatory or mandatory requirements. Appropriate regulations should be published by Air Navigation Authorities when the use of new surveillance techniques is to be introduced in the States.

1.1.4 The envisaged goal of this strategy is a regional surveillance infrastructure that enables the interoperability of aircraft equipage throughout the CAR/SAM Regions in cost effective way.

1.2 Scope of the Surveillance Strategy

1.2.1 Implementation of surveillance systems should be based on a harmonized strategy for the CAR/SAM Regions that would take into account the operational requirements and relevant cost-benefit analyses. It should also be based on Action Plans to ensure that CAR/SAM States, Territories and International Organizations implement the necessary systems in accordance with consistent timescales.

1.2.2 The surveillance technologies considered in this strategy to meet present and future operational expectations are listed below and briefly explained in Annex C:

- Primary Radar (PSR, SMR/ASDE);
- Secondary Surveillance Radar (SSR);
- Automatic Dependent Surveillance-Broadcast (ADS-B);
- Automatic Dependent Surveillance-Contract (ADS-C); and
- Multilateration.

1.2.3 In order to provide a global view of the surveillance strategy, the operational drivers, the required surveillance infrastructure and the regional studies and trials proposed in this document have been presented in chronological order.

1.2.4 The dates illustrated in this document define when surveillance systems are estimated to become regionally operational. Nevertheless, some of the surveillance systems described in this strategy will be used to solve local issues prior to the timelines in this document, and thereby will migrate from pioneer areas into larger regional areas.

1.2.5 New surveillance technologies implementation policy for the CAR/SAM Regions should be based first on a voluntary implementation in pocket areas, using certified existing equipage which is to be followed by an implementation in wider areas supported by the Implementing Rule related to the upgraded equipage.

1.2.6 Surveillance strategy should be seen as a link between the Global Air Navigation Plan for CNS/ATM Systems (Doc. 9750) and the stakeholders' strategy for the air surveillance applications.

1.2.7 This surveillance strategy is derived from the Global Air Navigation Plan for CNS/ATM Systems (Doc. 9750).

1.2.8 CAR/SAM States, Territories and International Organizations when implementing surveillance systems, need to be cognizant of the operational requirements of the Global ANP in particular GPIs 09 and 17 (Situational Awareness and Implementation of data link applications).

1.3 Structure of the Document

1.3.1 This document is structured as follows:

- Section 1 (this section) presents the general considerations, explains its scope and structure and describes the intended readers and relationship with other documents.
- Section 2 describes the Surveillance Operational Scenario Evolution, i.e. the envisaged operational drivers for the short (2008-2011), medium (2011-2015) and long terms (2015-2025) in the Air Surveillance field, for En-Route and TMA Airspace, Aerodrome Operations and Aircraft Systems.
- Section 3 details the Surveillance Infrastructure Evolution required to cope with the foreseen operational environment and specifies a tentative action plan that needs to be accomplished in a timely manner, in order to promote the operational use of the new surveillance technologies.
- Annex A provides the meaning of the Acronyms used in this document.
- Annex B provides the definitions of the different terms used in this document.
- Annex C describes the surveillance techniques discussed in this document.
- Annex D presents the potential airspaces for ADS-C and ADS-B implementation.
- Annex E presents IATA survey on navigation, surveillance and communication equipment on board of aircrafts.

1.4 Intended Readers

1.4.1 This strategy was developed for the following stakeholders group within the CAR/SAM Regions:

- The departments of the National Supervisory Authorities of CAR/SAM countries who are responsible for verifying ATM Surveillance Systems;

- The departments of the civil and military ANSP of CAR/SAM states that are responsible for procuring/designing, accepting, and maintaining ATM Surveillance Systems;
- The Airport Operators, who are responsible for procuring/designing, accepting, and maintaining Surveillance Systems at airports level; and
- The Airspace Users, who are the final clients of the ATM Surveillance Systems.

2. Surveillance Operational Scenario Evolution

2.1. En-Route and TMA Airspace

2.1.1. Each State/Territory/International Organization needs to evaluate the present day maximum density traffic and that expected for the year 2005 and give due consideration to the useful life of their radars and the potentiality for their replacement with ADS-B.

2.1.2. The surveillance operational scenario evolution for En-Route and TMA airspace is based on three fundamental principles for ground users in such airspace. These principles are dominant throughout the complete surveillance strategy and are:

- An independent surveillance system to track non-cooperative targets in TMA and En Route airspace where and when required;
- An independent surveillance system to track cooperative targets in TMA and en-route airspace; and
- Dependant cooperative surveillance.

2.1.3. For En-Route and TMA Airspace, security and safety will remain key requirements throughout. The need to provide detection of aircrafts that are not equipped with SSR transponders or ADS-B, as well as the ones experiencing an avionics failure, is permanent for TMA Airspace. Detection of non cooperative targets for En-Route Airspace will also remain for specific areas, according to homeland security requirements.

2.1.4. Short term (until 2011)

2.1.4.1 Until 2010, independent surveillance systems will be predominant in CAR/SAM Regions. Until then, target position will only be determined by the ground sensors (PSR, SSR and Mode S radars).

2.1.5. Medium term (2011-2015)

2.1.5.1. From 2010 onwards, the provision of ADDs to ground stations to support TMA and En Route operations is envisaged, following the increasing rate of SSR Mode S equipped aircraft (new and overhauled) that will be able to transmit ADS-B messages (ADS-B out).

2.1.5.2. The first set of new applications that are envisaged to be supported in CAR/SAM Region are the ground Surveillance (ADS-B out) in a non-radar environment (ADS-B-NRA), in a radar environment (ADS-B-RAD) and Airborne Derived Data (ADS-B-ADD). ADS-B-out is expected to reach initial operational capability status in 2015.

2.1.6. Long term (until 2015-2025)

2.1.6.1. Other possible new applications are related to Airborne Surveillance (ADS-B-in, possibly supplemented by TIS-B) including: Airborne situational awareness (ATSA-AIRB), visual separation on approach (ATSA-VSA) and In-trail Procedure in oceanic airspace (ATSA-ITP). ADS-B-in for air traffic situational awareness is expected to be launched after 2015.

2.1.6.2. It is anticipated that an integration of airport and airspace surveillance will become more widespread from 2015 onwards. This requires an increased integration of surveillance information at the SDPD level, which will require updating to process and deliver the new information to surveillance users as the new systems become operational.

2.1.6.3. Until 2015, the ground service provider will remain responsible for the separation service and for maintaining separation. However, from 2015 onwards, there will be a number of ATM concepts which will drive the evolution of the surveillance environment, these are:

- Enhanced medium term planning with the tasks of the controllers operating in En-Route and TMA sectors becoming increasingly supported by automation. The controller will make use of ADD to provide a more accurate view of the situation and improvements in safety nets;
- Surveillance derived information will be made available to support Airborne Traffic Situational Awareness;
- Flight data processing systems will be upgraded to provide full 4D trajectory prediction aligned with the capabilities of 4D FMS;
- The limited delegation of separation tasks to aircrews in low and medium density airspace will require additional avionics infrastructure and additional tools for the controller and aircrew; and
- Introduction of preferred routing will require flight information to be displayed in real time to the controller.

2.2. Aerodrome Operations

2.2.1 Short term (until 2011)

2.2.1.1 For selected airports, detection of all mobiles within the aerodrome area is permanent in short term and throughout the strategy timeframe.

2.2.2 Medium term (2011-2015)

2.2.2.1 The use of ADDs to support aerodrome operations is envisaged; and the implementation of A-SMGCS level I (which may include ADS-B Package I, ADS-B-APT application) and A-SMGCS level II will be enabled by systems such as Multilateration

2.2.3 Long term (until 2015-2025)

2.2.3.1 Where airport operators foresee a benefit, a long term implementation of A-SMGCS level III (which may include the ADS-B Package I, ATSA SURF application) and A-SMGCS IV may start. This may require an ADS-B-in infrastructure and an equipage of selected, appropriate airport vehicles with transponders.

2.3. Aircraft Systems

2.3.1 Short term (until 2011)

2.3.1.1 In the short term, the use of SSR or SSR Mode S systems for ground based surveillance radar or Multilateration systems will continue. This means that no additional equipment is foreseen on the aircraft until 2011.

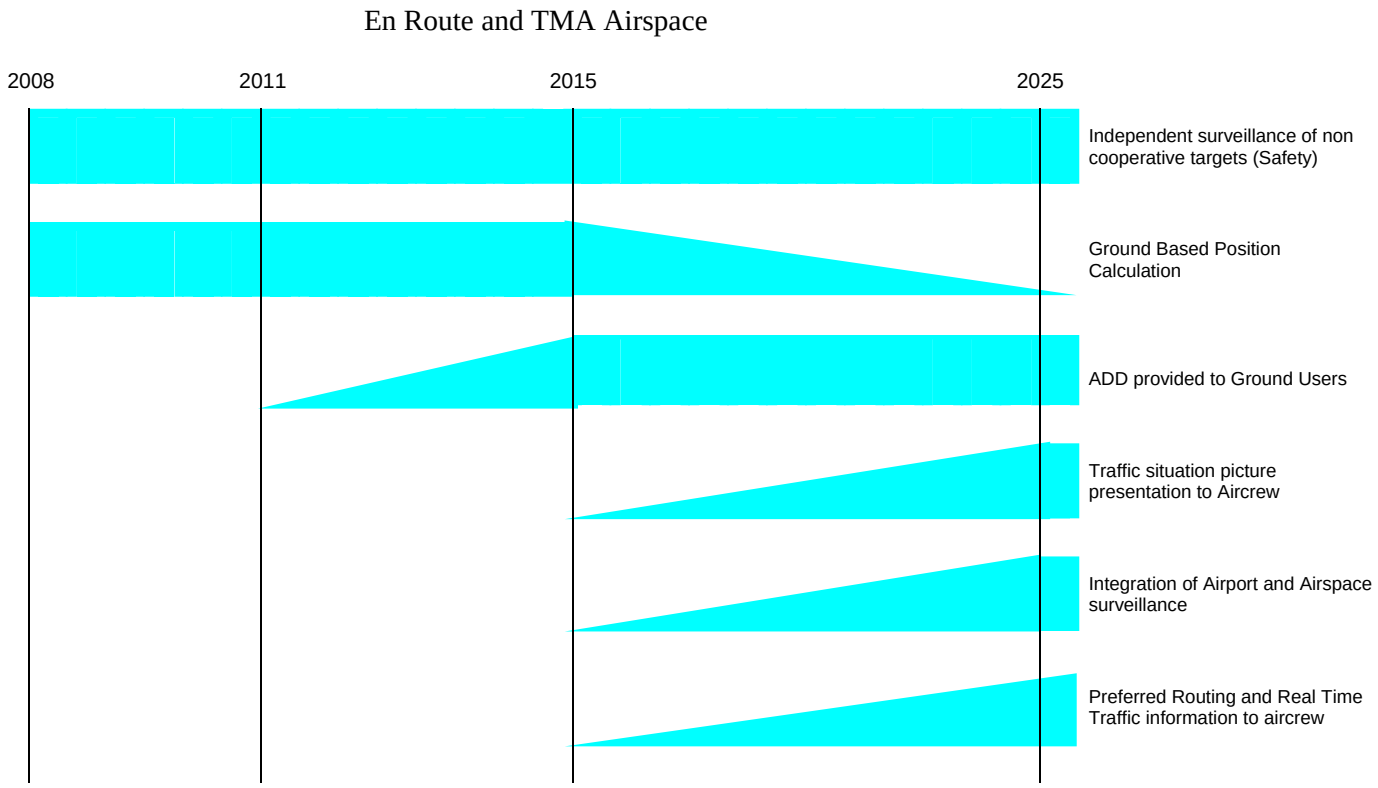
2.3.2 Medium term (2011-2015)

2.3.2.1 The implementation of new ground Surveillance Applications (ADS-B out) will increase, which will require integration between the aircraft navigation system and mode S transponders, in order to transmit intent information to other aircraft and ground users. This will be enabled by ADS-B using 1090 MHz Extended Squitter.

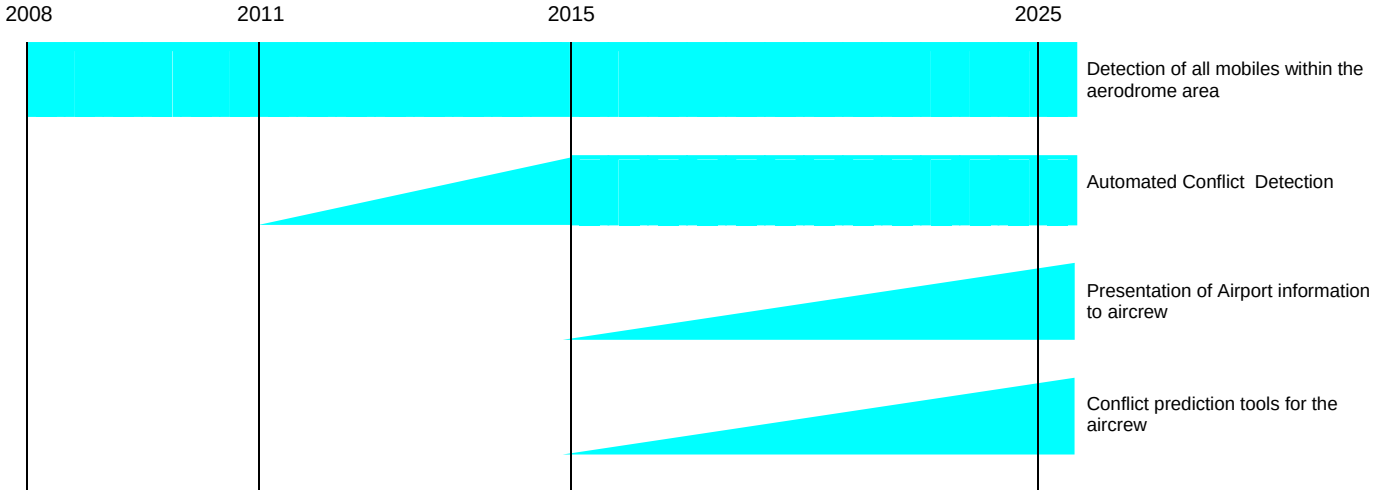
2.3.3 Long term (until 2015-2025)

2.3.3.1 The implementation of ADS-B ASAS situational awareness applications will require an airborne SDPS and display system.

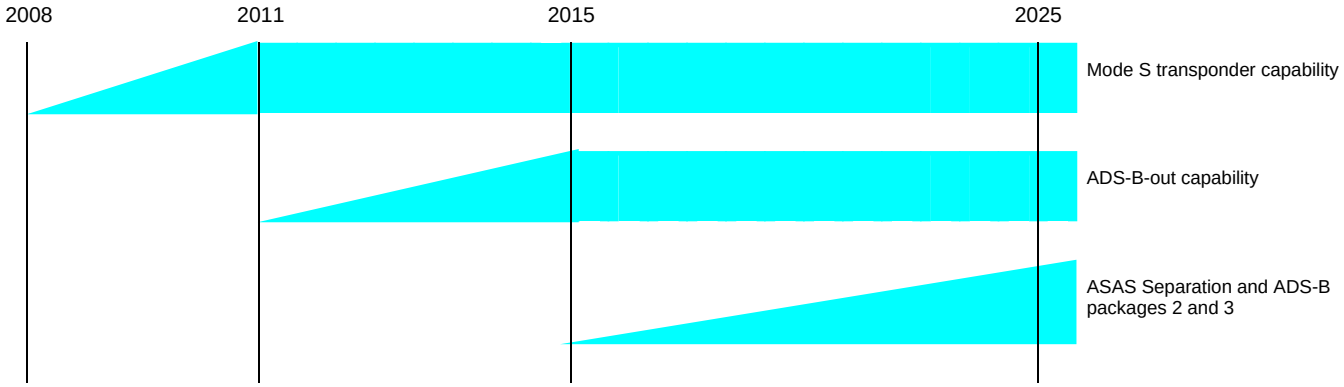
2.4. Operational Drivers Timeframe



Aerodrome Operations



Aircraft Systems



3. Surveillance Infrastructure Evolution

3.1. <u>En-Route and TMA Airspace</u>

3.1.1. Independent Surveillance, in the form of Primary Surveillance Radar still be used in En-Route Surveillance and Terminal Maneuvering Area (TMA) based on local country specific security requirements.

3.1.2 <u>Short term (until 2011)</u>

3.1.2.1 From 2008 to 2011, co-operative surveillance, in the form of SSR and SSR Mode S, will still be the main means of surveillance and will be extensively used for air traffic surveillance by civil agencies for TMA and En-Route services within coverage of (ground based) interrogator station(s). Implementation of monopulse SSR, adaptable to Mode S, in medium- and high-traffic en route and terminal areas will continue. Use of ADS-B (ES Mode S receivers) will begin to provide surveillance for en-route and terminal areas not covered with radar and to strengthen surveillance in areas covered with SSR Modes A/C and S.

3.1.3 Medium term (2011-2015)

3.1.3.1 SSR Mode S elementary surveillance will be implemented from 2010 onwards in high density TMAs in order to improve secondary radar performances. Since there will still exist legacy aircrafts that will not be able to reply on mode S, a mixed mode interrogation will be required up to 2015.

3.1.3.2 Ground implementation for ADS-B (based on ES Mode S receivers) will increase from 2011 onwards to fill en route and terminal areas not covered with radar and to strengthen surveillance in areas covered with SSR Modes A/C and S.

3.1.3.3 Depending on the percentage of ADS-B equipped aircrafts, wide area multilateration (WAM) implementation should be considered as a possible transition path to ADS-B environment in a shorter timeframe.

3.1.3.4 ADS-C surveillance should be operationally used in all oceanic and remote airspace associated with FANS 1/A capacities.

3.1.3.5 Surveillance Data Processing and Distribution systems based on surveillance server technology will have to be progressively upgraded, in order to merge legacy radar data information contained in the ADD and/or from Multilateration position calculations and promote data sharing between States using TCP/IP patterns.

3.1.3.6 Each State/Territory/Organization should investigate and report their Administration's policy in respect to the ADS-B data sharing with their neighbors and from cooperative goals.

3.1.3.7 The ADS-B data sharing plan should be based on 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.

3.1.3.8 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.

3.1.3.9 The ADS-B data links technology that will be used for the Mode S 1,090 MHz extended squitter (1090 ES). ADS-B data sharing could be initiated.

3.1.3.10 SSR Mode A/C and SSR Mode S will continue to be the main surveillance elements for approach, en route, and terminal areas.

3.1.4 Long term (until 2015-2025)

3.1.4.1 The majority of the SSR and SSR Mode S systems currently installed would be at the end of their operational life by 2015. SSR Mode A/C radars that have completed their life cycle by that time will not be replaced. 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 will fully replace those decommissioned SSRs.

3.2. Aerodrome Operations

3.2.1 Short term (until 2011)

3.2.1.1 The main technology for calculating the position of mobiles (both aircraft and vehicles) will be Surface Movement (primary) Radar. Implementation of multilateration will gradually increase, where aircraft respond to SSR Mode A/C or SSR Mode S queries.

3.2.2 Medium term (2011-2015)

3.2.2.1 A-SMGCS Level I/II will provide the benefits at the aerodrome and additional information may be required by the ground systems. The most effective means of achieving this would be via ADS-B, since aircraft will already be equipped and there will be a cost-effective upgrade path for the Multilateration ground stations, although there may be an impact on the avionics. Although many Multilateration systems are configured with their own data fusion trackers as standard, a possible upgrade to existing SDPDs to support Aerodrome operations will be required.

3.2.3 Long term (until 2015-2025)

3.2.3.1 The introduction of A-SMGCS Levels III/IV at selected aerodromes will require aircrew to be presented, with an airport map and other mobiles for situational awareness and possible conflict prediction tools in the aircraft. Where airports foresee a benefit from these kinds of applications then a TIS-B service may be required to ensure a complete and consistent airport situation picture.

3.3. Aircraft Systems

3.3.1 Short term (until 2011)

3.3.1.1 In accordance with ICAO requirements, all aircraft flying within CAR/SAM controlled airspace are required to be equipped with a pressure altitude reporting device. It is not foreseen that there will be significant changes for aircraft systems prior to 2011 on that matter.

3.3.1.2 The proportions of equipped aircrafts are also critical for the ADS-C and ADS-B deployment, for which it is required that ANSP and aircraft users periodically coordinate, al 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.

3.3.1.3 Until 2011 the implementation of ACAS II systems throughout commercial and general aviation will be completed using basic Mode S transponder for elementary surveillance (ELS). ADS transponders are to be integrated into the GNSS avionics for valid data.

3.3.1.4 This period will see:

- 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.

3.3.2 Medium term (2011-2015)

3.3.2.1 2011-2015 will see the implementation of Mode S in those monopulse SSRs that have Mode S capabilities, in areas with coverage and increased air traffic, increased ADS-B installations on ground (ES Mode S receivers) for en route and terminal areas not covered by radar, and strengthened surveillance in areas covered by SSR Mode A/C and SSR Mode S. The update of Mode S transponder will begin, so that it can operate in ADS-B and multilateration environments.

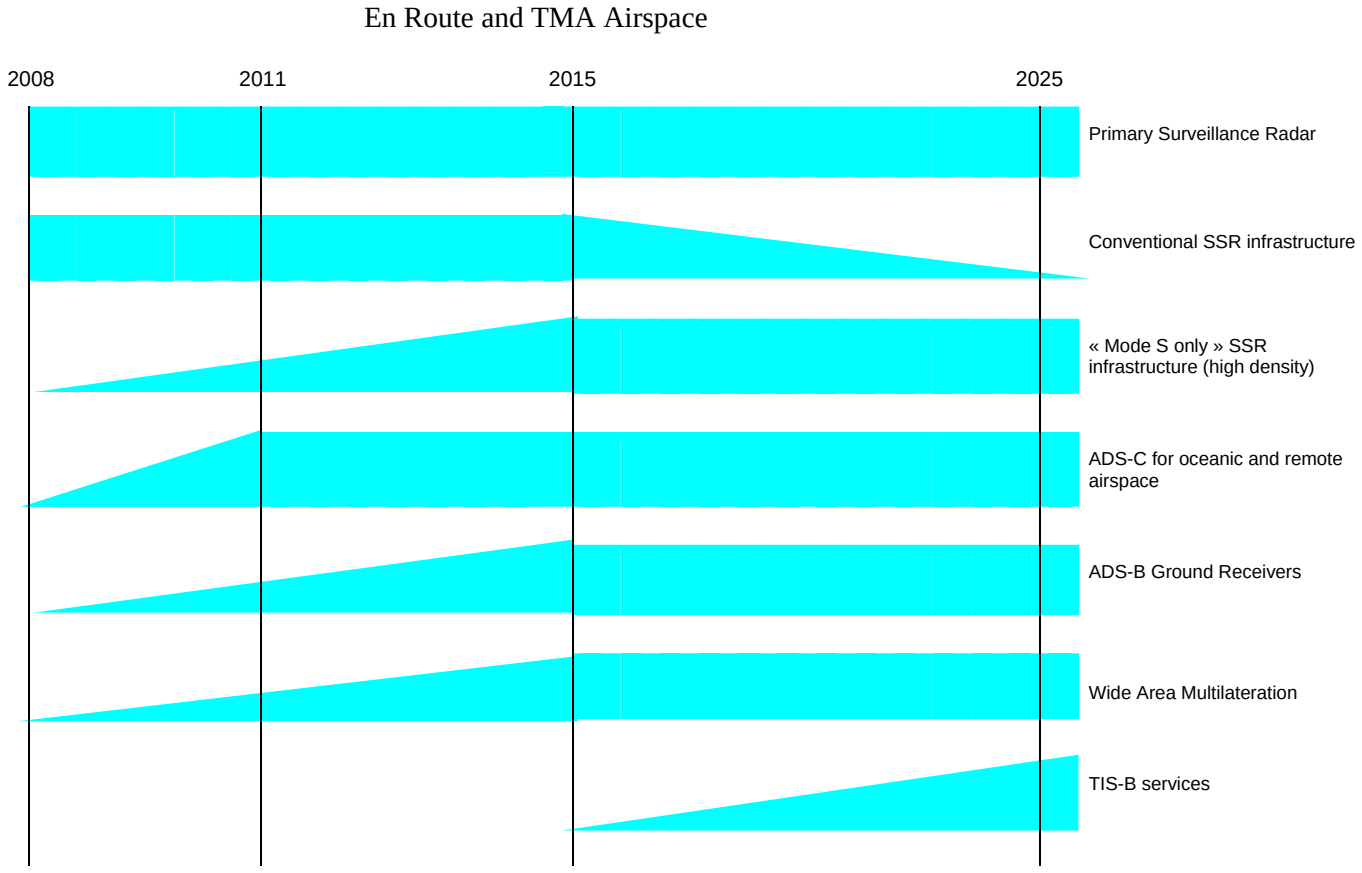
3.3.2.2 If aircraft are operating in airspace where the ADS-B Package I ground based surveillance applications are in use, then the avionics configuration will require changes to deliver the additional aircraft derived data required.

3.3.2.3 During the period 2011 – 2015 there will be increased 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.

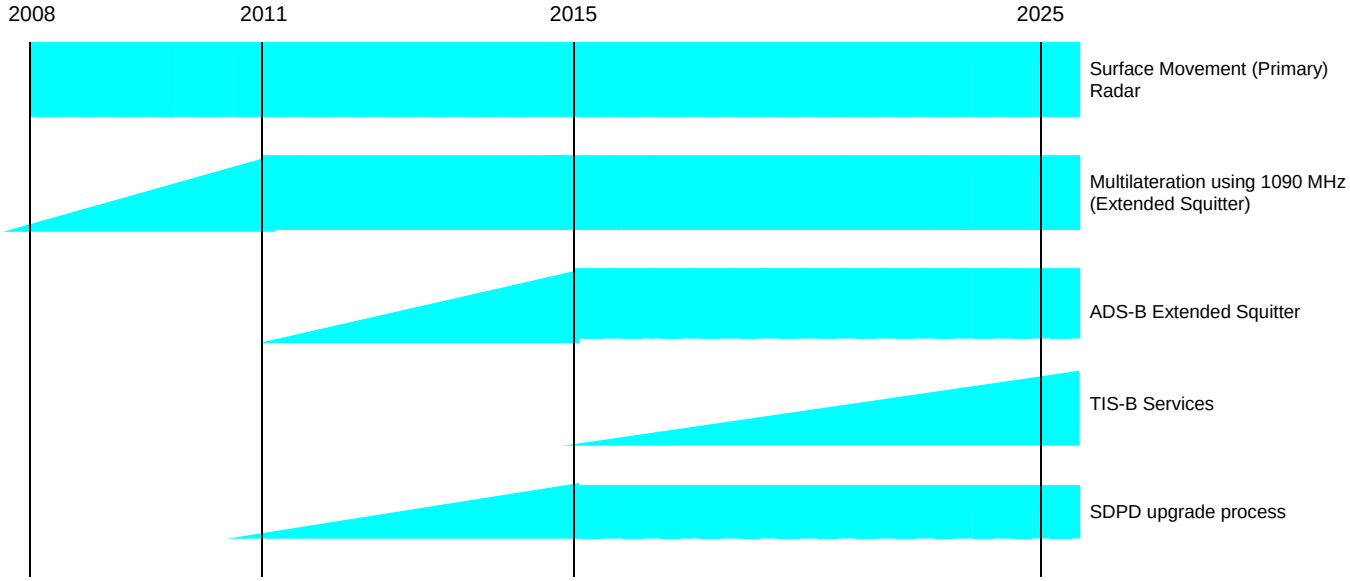
3.3.3 Long term (until 2015-2025)

3.3.3.1 From 2015 onwards, the move from ASAS spacing to ASAS separation and preferred routing may require a high integrity traffic situation picture, therefore the use of TIS-B may be required as well as the implementation of an airborne Surveillance Data Processing System (SDPS) to integrate ADS-B in and TIS-B for presentation of the air situation picture on a graphical display.

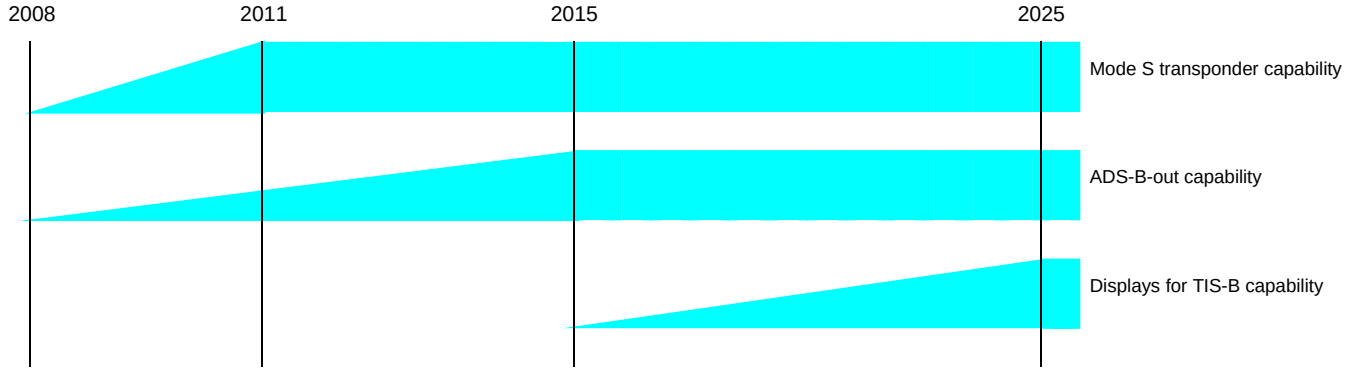
3.4. Surveillance Infrastructure Timeframe



Aerodrome Operations



Aircraft Systems



3.5. Regional Action Plan

3.5.1. Short term (until 2011)

3.5.1.1. There will be a continuous need in short term to perform periodic assignment and monitoring of mode S 24-bits address by all Civil Aviation Authorities in the CAR/SAM Regions. Regional trials will have to be conducted in order to support the operational introduction of new techniques such as ADS-B and WAM. Such assessments would include Cost Benefit Analyses, safety assessments and detailing operational requirements. In order to validate the timeframe forecasted by this surveillance strategy and assess the proportions of equipped aircrafts, each State/Territory/International Organization should evaluate the:

- useful life of their radars and the potentiality for their replacement with ADS-B;
- locations of potential ADS-C or ADS-B ground station sites;

- capabilities of existing and planned ATC automation systems to support ADS-C or ADS-B applications;
- maximum density traffic nowadays and expected for the year 2025;
- number of equipped aircrafts operating in the concern airspace;
- number, name and type of equipped aircraft of the airlines that have equipped aircrafts for mode S, ADS-C and ADS-B;
- rate of faulty Mode S airborne equipment and its behavior; and
- categorization of the accuracy/integrity data available in the aircrafts.

3.5.1.2. 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. It is also required to ensure that the regional surveillance standards and surveillance functional architecture are consistent with the Required Surveillance Performance (RSP), after the approval of RSP provisions (expected to be delivered by 2009).

3.5.1.3. As the increased dependence on ADS-B (1090 MHz Extended Squitter) is expected to grow, there is concern that the band will become saturated as more information is loaded onto the restricted band. Therefore it is required to study whether the use of 1090MHz will continue to support surveillance requirements.

3.5.2 Medium term (2011-2015)

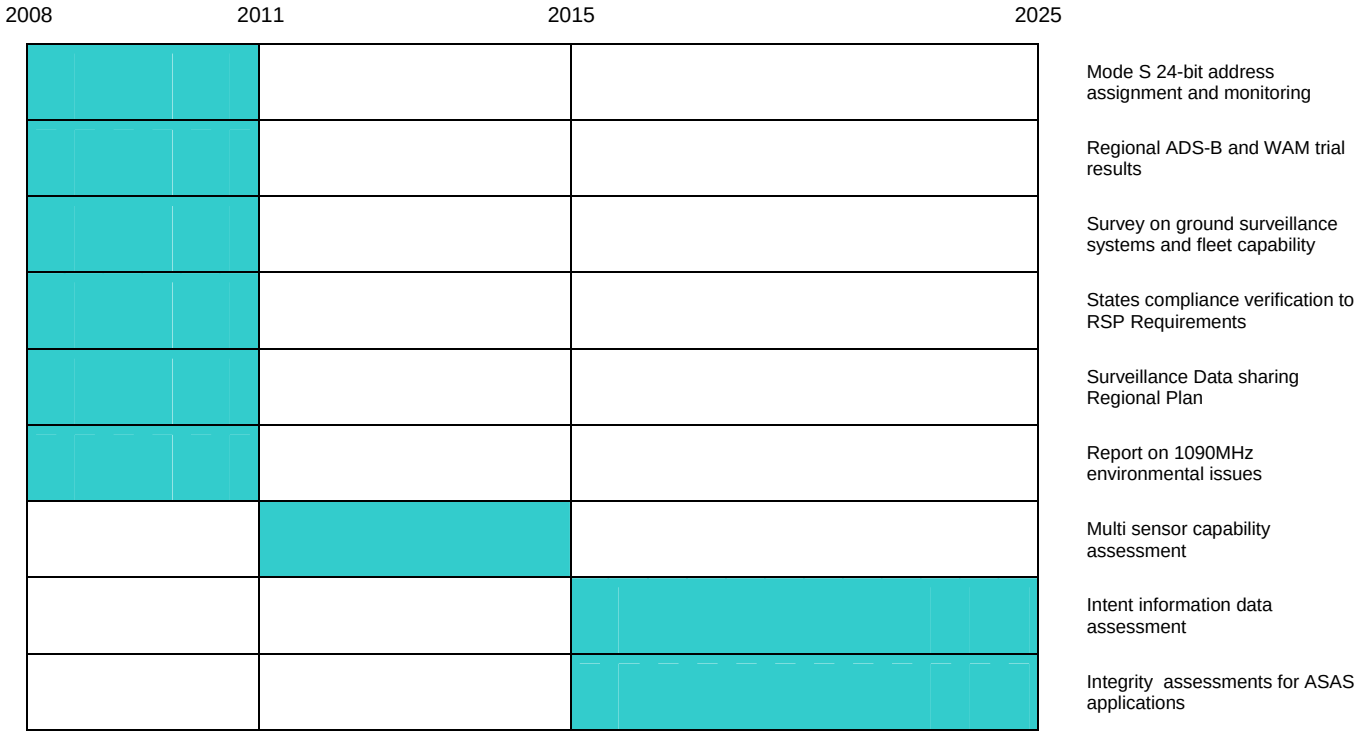
3.5.2.1 In medium term, the capabilities of current Multi Sensor Trackers are to be assessed in light of the more stringent requirements need to support and process increasing amount of ADD.

3.5.3 Long term (until 2015-2025)

3.5.3.1 In long term, it is required to identify the impact of the new procedures that are predicted to require ‘intent’ information from the aircraft. The precise definition of intent requires clarification to ensure avionics equipment and ground processing products can be developed in time to deliver the required information. It is also required to identify whether the integrity requirements of the information presented to the aircrew while performing ADS-B Package I airborne surveillance applications may require the need for the uplink of traffic information to the aircraft to validate the integrity of the navigation data transmitted by ADS-B.

3.6. Regional Action Plan Timeframe

Regional Action Plan Timeframe



ANNEX A

ACRONYMS

ACAS	Aircraft Collision Avoidance System
ADD	Aircraft Derived Data
ADS	Automatic Dependent Surveillance
ADS-B	ADS-Broadcast
ADS-C	ADS-Contract
ANC	Air Navigation Council
ANSP	Air Navigation Service Provider
APP	Approach (Centre or Control)
ASAS	Airborne Separation Assistance System
ASDE	Airport Surveillance Detection Equipment
A-SMGCS	Advanced Surface Movement and Guidance Control System
ATC	Air Traffic Control
ATM	Air Traffic Management
CDTI	Cockpit Display of Traffic Information
CNS	Communications Navigation and Surveillance
CPDLC	Controller Pilot Data link Communications
FDPS	Flight Data Processing System
FMS	Flight Management System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICAO	International Civil Aviation Organization
M-SSR	Mono-pulse Secondary Surveillance Radar
PSR	Primary Surveillance Radar
RSP	Required Surveillance Performance
SARPs	Standards and Recommended Practices
SDPD	Surveillance Data Processing and Distribution System
SMGCS	Surface Movement Guidance and Control System
SMR	Surface movement Radar
SSR	Secondary Surveillance Radar
TCAS	Traffic Collision Avoidance System
TIS-B	Traffic Information Service - Broadcast
TMA	Terminal Maneuver (Control) Area

ANNEX B

DEFINITIONS

Surveillance is defined as the technique for the timely detection of targets and the determination of their position (and if required, the acquisition of supplementary information relating to targets) and the timely delivery of this information to users in support of the safe control and separation of targets within a defined area of interest.

Ground Based Surveillance is defined as 'ground based techniques for the timely detection of targets and the determination of their position (and if required, the acquisition of supplementary information relating to targets) and the timely delivery of this information to users in support of the safe control and separation of targets within a defined areas of interest'. The 'defined area of interest'' relates to the ability of the User to select which information is deemed necessary to ensure the safe implementation of the surveillance application within the physical airspace for which they are responsible.

Independent surveillance is a technique where the position of the aircraft is calculated by the ground and is not dependent on position data transmitted by the aircraft.

Dependent surveillance like ADS-B is based on the principle of the target informing the ground system and other targets of its own position. The target may also provide aircraft derived data. Dependent surveillance delivers Aircraft Derived Data (ADD). ADD may contain navigation position, identification and other data from the aircraft.

Cooperative surveillance is a technique that requires the mobile to equip with a dedicated surveillance systems which responds to transmissions from the ground system.

Non Cooperative surveillance is a technique where the position of the aircraft is calculated by the ground and is not dependent on position data transmitted by the aircraft or upon any deliberate interaction in the aircraft with active components e.g SSR transponders.

Basic surveillance delivers to the surveillance user:

- Aircraft position (latitude, longitude and altitude)
- Mode A

Elementary surveillance includes basic surveillance and also delivers to the surveillance user:

- Aircraft identity - Flight Identity or tail registration and 24 bit address,
- Flight Status,
- Aircraft pressure altitude in 100 ft or 25 ft units, if the aircraft is appropriately equipped.

Enhanced Surveillance delivers to the surveillance user a set of Aircraft Derived Data (ADD) to provide additional information to ground or air based ATM systems and safety nets. Enhanced surveillance may be delivered to ground system through Mode S SSR, ADS-B or Multilateration system (through active interrogations).

Aircraft Derived Data Different cooperative surveillance technologies extract different information from the aircraft. In its simplest form, the Mode A and Mode C information provided by the aircrafts SSR transponder can be classified as aircraft derived data or down linked aircraft parameters. When implemented using SSR Mode S, the following current or short term Aircraft Parameters are automatically extracted from the aircraft:

- Air Speed (Indicated Air Speed and Mach Number)
- Ground Speed
- Magnetic Heading Roll Angle

- Selected Altitude Track Angle Rate (or, if not available, True Air Speed)
- True Track Angle Vertical Rate

The enhanced surveillance parameters delivered by ADS-B include the position and longer term intent parameters e.g. 4D trajectory, trajectory change points etc.

Surveillance users are:

- Oceanic ATM Centers
- En-Route ATM Centers
- TMA/Approach ATM Units
- Airports/Tower ATM & Ground Traffic Management Units
- Military Centers
- Airline Aircraft Operations Centre
- Enhanced Tactical Flow Management System
- Data processing systems, such as Flight Data Processing Systems
- ATM Tools, such as Short Term Conflict Alert
- The target
- Adjacent Surveillance Functions
- Non ATM functions (e.g. Search and Rescue).

Surveillance Data Processing and Distribution systems accept information from surveillance sensors, process the information to develop the 'best' estimate of the position of a target and supply this information to users. In addition the SDPD may receive ADD and distribute this to surveillance users attached to the position information.

A-SMGCS is an airport system which provides surveillance to a ground controller. It has four implementation levels that provide different levels of functionality:

Level I A-SMGCS provides:

- Position; the presentation to a controller of the location of an aircraft or vehicle;
- Identification; the presentation to the controller the identity (flight identification or call sign) of the aircraft or vehicle.

Level II A-SMGCS provides a conflict prediction function to alert the controller of:

- Potential collisions (between aircraft/vehicle or aircraft/aircraft) on the runway surface or protected areas
- Potential entry of aircraft or vehicles into restricted areas.

Level III A-SMGCS includes functions that are being defined by the Airports and Environments Business Division to share traffic situation awareness amongst pilots and drivers and the introduction of the automated routing function. The guidance function may be enhanced by:

- Display of the airport map showing taxiways, runways, obstacles and the mobile position to aircrew and drivers;
- Providing dynamic map with updates of the runway status
- Triggering automatically the dynamic ground signs (stop bars, centerline lights, etc.) according to the route issued by the controller.

Level IV A-SMGCS corresponds to the improvement of the functions implemented at the level III. Of particular note to the surveillance strategy, the control function will be complemented by a conflict resolution function in the cockpit or vehicle.

ADS-B Package I is a set of Ground Based Surveillance, Airborne Traffic Situational Awareness and Airborne Spacing applications. Note that since reference 6 was published, the application descriptions have been refined, although they remain largely in accordance with the referenced document. The text below summarizes the applications as of November 2005.

ADS-B Package I Ground Based Surveillance Applications are aimed at improving ATC surveillance on the ground for En-Route and TMA airspace and on the airport surface and at enhancing ATC tools through the provision of aircraft derived data enabled by ADS-B. These applications are:

- ADS-B-RAD ATC surveillance for TMA and En-Route airspace in areas that are already covered by radar systems
- ADS-B-NRA ATC surveillance in non-radar areas
- ADS-B-APT Airport surface surveillance
- ADS-B-ADD Aircraft derived data for ATC tools

ADS-B Package I Airborne Surveillance Applications are aimed at improving airborne (cockpit) surveillance in En-Route and TMA airspace as well as on the airport surface. These applications are:

- ATSA-SURF Enhanced traffic situational awareness on the airport surface
- ATSA-VSA Enhanced visual separation on approach
- ATSA-ITP In-trail procedure in oceanic airspace
- ATSA-AIRB Enhanced traffic situational awareness during flight operations

ADS-B Package I Airborne Spacing Applications are aimed at using airborne (cockpit) surveillance capabilities to carry out applications where the flight crew is able to maintain a time or distance from designated aircraft. These applications are:

- ASPA-S&M Enhanced sequencing and merging operations
- ASPA-C&P Enhanced crossing and passing operations

ASAS Applications are a set of operational procedures for controllers and flight crews that make use of the capabilities of Airborne Separation Assistance Systems to meet a clearly defined operational goal.

Airborne Spacing (ASPA) is an ASAS application category where the flight crew is able to maintain a time or distance from designated aircraft. The controller can use new spacing instructions to expedite and maintain an orderly and safe flow of traffic and is still responsible for providing separation in accordance with the applicable ATC separation minima. New procedures and responsibilities are expected with the introduction of Airborne Spacing applications.

Airborne Separation is an ASAS application category where the flight crew is able to provide separation from designated aircraft in accordance with the applicable airborne separation minima. In this application the controller can delegate separation relative to a designated aircraft to the flight crew through a new clearance however the controller is responsible for providing separation in accordance with the applicable ATC separation minima from other aircraft. New procedures and responsibilities are expected with the introduction of Airborne Separation applications.

Airborne Self Separation is an ASAS application where the flight crew is able to provide separation from all known aircraft in accordance with the applicable airborne separation minima. Airborne self separation is not considered within the timescales of this strategy.

ANNEX C

SURVEILLANCE TECHNIQUES

Primary Radar (PSR, SMR/ASDE)

Primary Radar operates by radiating high levels of electromagnetic energy and detecting the presence and characteristics of echoes returned from reflected objects.

Target detection is totally based on the reception of reflected energy, it does not depend on any energy radiated from the target itself, i.e. no carriage of airborne equipment is required.

Secondary Surveillance Radar (SSR)

Secondary Surveillance Radar (SSR) operates by transmitting coded interrogations in order to receive coded information from all SSR transponder equipped aircraft, providing a two way "data link" on separate interrogation (1030 MHz) and reply (1090 MHz) frequencies.

Replies contain positive identification, as requested by the interrogation, either one of 4096 codes (Mode A) or aircraft pressure altitude reports (Mode C). The co-operative concept ensures stable received signal strength and considerably lower transmitted power levels than Primary Radar. SSR enables Basic Surveillance.

SSR Mode S is a development of SSR using the same interrogation and reply frequencies as the SSR but the selective interrogations contain a unique 24 bit address that ensures all transmissions are only decoded by one aircraft's Mode S Transponder having that 24 bit address.

A Mode S station also transmits conventional SSR formats in order to detect SSR only aircraft (Mode A/C) in order to be downward compatible with SSR.

The SSR Mode S transponder is also a fundamental part of the ACAS airborne installation and the ADS-Broadcast when using the 1090 MHz Extended Squitter transmission. SSR Mode S enables elementary and enhanced surveillance.

Automatic Dependent Surveillance-Broadcast (ADS-B)

Automatic Dependent Surveillance - Broadcast (ADS-B) is a surveillance technique that allows the transmission of aircraft derived parameters, such as position and identification, via a broadcast mode data link for use by any air and/or ground users.

Each ADS-B emitter periodically broadcasts its position and other data provided by the onboard aircraft avionics systems. Any user, either airborne or ground based, within range of the emitter may choose to receive and process the information. Three technology options are available, these are ADS-B 1090ES [which has been selected as the initial link for CAR/SAM Region], VDL Mode 4 (Very High Frequency Data Link) and UAT (Universal Access Time). ADS-B enables elementary and enhanced surveillance.

Automatic Dependent Surveillance-Contract (ADS-C)

Automatic Dependent Surveillance - Contract (ADS-C) is a surveillance technique in which aircraft provide, via a data link, data such as position and identification, derived from the onboard aircraft avionics systems. A "contract" is established between the aircraft and the ground to transmit data at a particular event. An event could be time based, position based or as specified in the contract.

Currently ADS-C is usually implemented via SATCOM but any data link having the range capability would suffice. Whilst originally envisaged to be an ATN compliant data link, current implementations exploit a large part of the functionality through the FANS 1/equipment currently carried by many aircraft.

Traffic Information Service – Broadcast (TIS-B)

An air traffic situation picture derived by a ground based Surveillance Data Processing System may be broadcast from the ground to all aircraft within range and equipped with correct receivers. There are three roles of TIS-B, these are:

- TIS-B fundamental service: This ‘gap filler service broadcasts information about aircraft that cannot be adequately obtained directly by ADS-B and is used to enhance the availability of surveillance information to users that are not normally able to receive ADS-B transmissions from other aircraft. This service will normally exclude from transmission those aircraft broadcasting ADS-B messages
- ADS-B validation service: This optional service compares aircraft ADS-B state vector data with surveillance data from ground-based sensors and broadcasts validation data
- ADS-B rebroadcast service: The automatic rebroadcast of ADS-B messages received over one data link, translated directly onto other data links for the purpose of extending ADS-B connectivity to users of incompatible data links.

Multilateration

Multilateration is a surveillance technique where aircraft replies from other SSR or SSR Mode S interrogations or spontaneous squitter message from Mode S transponder are passively received by 3 or more ground receiver stations. Using time of arrival techniques the position and altitude of the target can be determined. In some Multilateration systems, active Mode S selective interrogations are used to extract data from the aircraft.

The surveillance strategy distinguishes three levels of functionality, which are:

- Basic operation in which Multilateration uses time of arrival of signals to determine the position of aircraft.
- Elementary operation, which includes basic operation and the addition of active integrations to extract aircraft identification information from the flight systems
- Enhanced operations, which includes basic operations and the addition of active interrogations to extract any information (including aircraft identification) from the aircraft systems.

ANNEX D

POTENTIAL AIRSPACES FOR ADS-C AND ADS-B IMPLEMENTATION IN CAR/SAM REGION

Nb	State or Organization/ Center	Air Space	ADS Type	Status	Impl. Date	Remarks
1	Bahamas/ Nassau ACC	Nassau FIR	ADS-B	Study		Studies are being carried out
2	Cuba/ Habana ACC	Havana FIR (South East Zone)	ADS-B	Study		Studies are being carried out
3	Haiti/ Port au Prince ACC	Port au Prince FIR	ADS-B	Study		Studies are being carried out
4	México/ Mérida ACC Monterrey ACC	Golf of Mexico (Central zone between Houston Oceanic and Mexico FIRs)	ADS-B	Planned		Based on an agreement Mexico - USA
5	Trinidad and Tobago / Piarco ACC	Piarco FIR	ADS-B ADS-C (*)	Planned		Studies are being carried out *Oceanic East Sector
6	United States/ Houston ARTCC Miami ARTCC	Golf of Mexico (Central zone between Houston Oceanic and Mexico FIRs) Miami Oceanic FIR (Domestic Zone)	ADS-B ADS-B	Planned Planned		Based on an agreement Mexico - USA
7	COCESNA/ Cenamer ACC	Cenamer FIR (Caribbean and Pacific Oceanic sectors)	ADS-B	Study		Studies are being carried out
8	Argentina	Ezeiza FIR Oceanic Zone	ADS-C	Planned		Planned to be implemented at the end of first trimester of 2007
9	Brasil/ Atlântico ACC	Atlântico FIR	ADS-C	Planned		Planned to be fully implemented at the end of second trimester of 2009

Nb	State or Organization/ Center	Air Space	ADS Type	Status	Impl. Date	Remarks
10	Chile/ Chile´s ACC	Chile FIR (Continental and Oceanic air Space)	ADS-C	Study		

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ENCUESTA IATA

SOBRE EQUIPOS DE NAVEGACIÓN, VIGILANCIA Y COMUNICACIONES A BORDO DE LAS AERONAVES

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			
	A330		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	
	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)
	B767-300		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			
British Airways	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		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			
Delta	B737-800		Y		Y	Y		Y	Y	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			* approx 20% have GPS
	B757-200ER		Y		Y*	Y		Y	Y	Y		Y	Y	Y	Y							Y	Y	Y		Y			* approx 25% have GPS
	B767-300 / 300ER		Y		Y*	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y*	Y*		Y	Y	Y		Y		Y*	* approx 65% have SATCOM currently / approx 25% have GPS
	B767-400		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y*	Y*		Y	Y	Y		Y		Y*	* approx 40% have SATCOM currently
	B777		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y				Y	Y		Y	Y	Y		Y		Y	
Emirates	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	A340		Y		Y	Y	Y	Y	Y	Y		Y	Y									Y	Y	Y		Y		Y	

ENCUESTA IATA

SOBRE EQUIPOS DE NAVEGACIÓN, VIGILANCIA Y COMUNICACIONES A BORDO DE LAS AERONAVES

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	
JAL	B747 (without FMS,GPS)		N	–	N	N (INS)	–	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	Y	N	Y	N	N	N	N	
	B747 (with FMS,GPS)		Y	–	Y	Y	–	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y※4	Y	N	Y	N	Y	Y	Y	※4:Applicable only for airplanes complied with European EL (Transponder with Extended Squitter)
	B747-400		Y	–	Y	Y	–	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y※2	Y※5	Y	Y※5	Y	N	Y	N	Y※2	※2:Applicable only for international airplanes※5:Applicable only for long range international airplanes
	B777		Y	–	Y	Y	–	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y※2	Y※6	Y	Y※6	Y	N	Y	N	Y※2	※2:Applicable only for international airplanes※6:Applicable only for long range international airplanes and airplanes delivered after April 2004.
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	
	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	
	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	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	
	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
	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
UPS	A300		Y		Y	Y	Y	Y	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			
US Airways	A319/320/321		Y		Y	Y			Y						Y								Y	Y*		Y			* Some A319/320/321
	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			

APPENDIX J

ADS-B, ADS-C AND MULTILATERATION TRIALS IN THE CAR/SAM REGIONS

Brazil

Brazil informed that ADS-C operational capability will be achieved in Oct/2008, and that ADS/CPDLC FANS 1/A will attain operational capabilities in Apr/2009, using a final platform developed by ATECH. Regarding ADS-B and MLAT, the Brazilian Administration has promoted modernization programs on current surveillance radar systems and has installed new radars throughout the country. The result of those initiatives is that the current radar network in Brazil is considerably new (less than 7 years old) and the coverage for secondary radars is complete for the entire 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 ADS-B/MLAT, since it represents an homogeneous airspace (helicopters only) that has partial radar coverage and would be a good Test Bed for the comparison between the performance of ADS-B/MLAT and a radar system. Recently, DECEA, Petrobrás (Brazilian Oil Company) and the helicopters operators worked on the re-design of the routes (RNAV) based on GNSS procedures. It is expected that the design of new routes will be ready in September 2008. Once that work is done, it will be possible to identify the surveillance operational needs in order to decide which surveillance application would be the most appropriate to that area.

Cuba

The phase of collecting ADS-B data from their first trials has been completed AND more ADS-B trials will be done during the 2008-2010 period.

Trinidad and Tobago

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 new ATM System is fully up and running.

United States

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.

COCESNA

ADS-B trials were conducted in order to obtain statistical information on the equipage of aircrafts in the Region. Refer to the **Annex**.

ANNEX
COCESNA ADS-B TRIAL ACTIVITIES

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 and CPDLC Communications:

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 Proccesors (SDP) for processing as ADS and ADS/SSR information, as well as the recording of all these messages.

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APPENDIX K

ACTIVITIES TO BE CONSIDERED FOR ADS-B TRIAL

Activities to be considered for ADS B Trial

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

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.

Expected Criteria

- 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.

Test parameters

- 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.

Trial Limitations

- 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.

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.

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APPENDIX L

CONSIDERATIONS FOR STATES/TERRITORIES/INTERNATIONAL ORGANIZATIONS TO CARRY OUT ADS-B TRIALS WITH THE FAA

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 to sign.

Timelines established in accordance to terms of bilateral agreement.

Start of the activities.

Roles and Responsibilities:

The U.S. FAA will:

a) Following request from a Civil Aviation Authority (CAA), negotiate and enter into a bilateral agreement;

b) Provide analysis and technical assistance to explore Surveillance and Broadcast Services solutions and benefits; and

c) Provide a service provider option for the participating State to procure surveillance services.

The CAR/SAM States/Territories/International Organizations:

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.

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APPENDIX M

SAMPLE AERONAUTICAL INFORMATION CIRCULAR (AIC)
RECOMMENDED TEXT OF STATE AIC

Notes		ICAO 24-Bit Aircraft Addresses and Aircraft Identification Reporting
1. State to insert date and reference of last circular issued for Mode S Surveillance, if applicable.		**1 INTRODUCTION** 1.1 The provision of air traffic services (ATS) using SSR Mode S will rely on a unique ICAO 24-bit aircraft address for selective interrogation of individual aircraft. The 24-bit aircraft address is also an essential element of the airborne collision and avoidance system, ACAS II. In addition, Mode S surveillance requires the reporting of aircraft identification as stated in previous circulars concerning Mode S airborne equipment requirements. (note 1). 1.2 The aircraft address shall be one of 16 777 214 twenty-four-bit aircraft addresses allocated by ICAO to the State of Registry or common mark registering authority and assigned as prescribed in the Appendix to Chapter 9, Part I, Volume III, ICAO Annex 10. 1.3 All Mode S equipped aircraft engaged in international civil aviation are required to have an aircraft identification feature as prescribed in ICAO Annex 10, Volume IV, Chapter 2, 2.1.5.2. 1.4 This circular provides guidance to ensure consistency regarding 24-bit aircraft addresses and the reporting of aircraft identification relevant to the operational introduction of Mode S Elementary and Enhanced Surveillance. In particular: a) Adherence to the world-wide scheme for assignment of ICAO 24-bit Aircraft Addresses. b) Correct setting of Aircraft Identification by flight crew.
2. Insert name of State and title of applicable organisation responsible for 24-bit aircraft address assignment		**2 THE ICAO 24-BIT AIRCRAFT ADDRESS** 2.1 Instances occur of incorrect 24-bit aircraft addresses being installed/hard-wired on individual aircraft. This has happened not only on first installation of a Mode S transponder but also when a major modification has been made to the Mode S equipment, and following a change of State of Registration. Incorrect installation, such as setting the address to all zeros, or, inadvertent duplication of an address can pose a severe risk to flight safety. In particular, the airborne collision avoidance system, ACAS II, performs on the assumption that only a single, unique 24-bit aircraft address per airframe exists. The performance of ACAS II can be seriously degraded and in some instances disabled if an incorrect or duplicate address is installed on an aircraft. 2.2 Incorrect or duplicated 24-bit aircraft addresses will also undermine the effectiveness of surveillance services based on SSR Mode S. 2.3 It is essential that aircraft operators comply with the aircraft address assignment procedures of the State regulatory authority to which blocks of addresses have been allocated by ICAO (note 2). 2.4 The world-wide addressing scheme has been designed so that, at any one time, no address is assigned to more than one aircraft. Only one address can be assigned to an aircraft and it cannot be changed except under exceptional circumstances authorised by the State regulatory authority concerned. 2.5 When an aircraft changes its State of Registry, the previously assigned address is to be relinquished and a new address assigned by the new registering authority.

Notes		ICAO 24-Bit Aircraft Addresses and Aircraft Identification Reporting
		2.6 It is essential that the aircraft address is periodically verified using ramp tests. Such checks must also be conducted when a major maintenance check has taken place and when the aircraft has changed registration, to ensure that a newly assigned address has been properly set.
		3 CORRECT SETTING OF AIRCRAFT IDENTIFICATION 3.1 To comply with European airborne equipment requirements, Mode S transponder equipped aircraft must incorporate an Aircraft Identification Feature. Correct setting of aircraft identification is essential for the correlation of radar tracks with flight plan data in the ATM and Airport Operator ground systems. Initial operational trials using SSR Mode S have shown that many aircraft are transmitting incorrect aircraft identification, e.g. BC_1234 instead of ABC1234. Such erroneous settings of aircraft identification prohibit automatic flight plan correlation and, if perpetuated, will severely limit the effectiveness of Mode S to relieve the shortage of SSR codes. 3.2 In accordance with ICAO Doc 8168 *[PANS-OPS]* Vol. I, Part VIII, 1.3, flight crew of aircraft equipped with Mode S having an aircraft identification feature shall set the aircraft identification in the transponder. This setting shall correspond to the aircraft identification specified in item 7 of the ICAO flight plan, or, if no flight plan has been filed, the aircraft registration. 3.3 Aircraft Identification, not exceeding 7 characters is to be entered in item 7 of the flight plan and set in the aircraft as follows: Either, a) The ICAO three-letter designator for the aircraft operating agency followed by the flight identification (e.g. KLM511, BAW213, JTR25), when: in radiotelephony the callsign used consists of the ICAO telephony designator for the operating agency followed by the flight identification (e.g. KLM 511, SPEEDBIRD 213, HERBIE 25). Or, b) The registration marking of the aircraft (e.g. EIAKO, 4XBCD, OOTEK), when: 1) in radiotelephony the callsign used consists of the registration marking alone (e.g. EIAKO), or preceded by the ICAO telephony designator for the operating agency (e.g. SVENAIR EIAKO), 2) the aircraft is not equipped with radio. Note 1 No zeros, dashes or spaces are to be added when the Aircraft Identification consists of less than 7 characters. Note 2 Appendix 2 to ICAO Doc 4444 *[PANS-ATM]*, refers. ICAO designators and telephony designators for aircraft operating agencies are contained in ICAO Doc 8585.
3. State to insert local points of contact		**4 FURTHER INFORMATION** Further information or guidance may be obtained from: DGAC contact information or Website