INTERNATIONAL CIVIL AVIATION ORGANIZATION

CAR/SAM REGIONAL PLANNING AND IMPLEMENTATION GROUP

(GREPECAS)

FIRST MEETING OF THE COMMUNICATIONS, NAVIGATION AND SURVEILLANCE / AIR TRAFFIC MANAGEMENT SUBGROUP

(CNS/ATM/SG/1)

FINAL REPORT

(Lima, Peru, 15 to 19 March 2010)

Prepared by the Secretariat

March 2010

TABLE OF CONTENTS

Contents **Page**

HISTORY OF THE MEETING

ii.1 Place and Duration of the Meeting

The First Meeting of the CNS/ATM Subgroup (CNS/ATM/SG/1) of GREPECAS was held at the Hotel Novotel, in Lima, Peru. The Meeting commenced on 15 and ended on 19 March 2010.

ii.2 Opening Ceremony and other matters

Mr. Franklin Hoyer, Regional Director of the ICAO SAM Regional Office welcomed the participants to this Meeting and highlighted the importance of the work of this Subgroup. Afterwards, Mr. Ramon Gamarra, Director of Civil Aviation of the Dirección General de Aeronáutica Civil (DGAC), Peru, welcomed the Subgroup to Peru and officially opened the Meeting.

ii.3 Organization, Officers and Secretariat

The Meeting was chaired by Mr. Raymundo Hurtado (Peru), and vice-chaired by Mr. Fidel Ara (Cuba). Mr. Onofrio Smarrelli, Regional Officer CNS, ICAO SAM Regional Office and Secretary of the CNS/ATM Subgroup, was assisted by Messrs. Víctor Hernández, ATM/SAR Regional Officer, ICAO NACC Regional Office and Co-Secretary of the CNS/ATM Subgroup; Jorge Fernández, ATM/SAR Regional Officer, ICAO SAM Regional Office; Alberto Orero ATM/SAR/AIM Regional Officer, ICAO SAM Regional Office; Julio Siu, CNS Regional Officer, ICAO NACC Regional Office; Nikki Goldschmid, ATM Assistant, ICAO EUR/NAT Regional Office; Hindupur Sudarshan, Consultant at ICAO Headquarters; and Aldo Martinez, CNS Expert, Technical Cooperation Bureau, ICAO Headquarters.

ii.4 Working Languages

The working languages of the Meeting were English and Spanish. The documentation and the Report of the Meeting were issued in both languages.

ii.5 Agenda

The following agenda was adopted:

Agenda Item 1: Follow up to valid CNS- and ATM-related conclusions and decisions adopted by GREPECAS and reviewed by the ANC. Analysis to the status of CAR/SAM CNS and ATM air navigation deficiencies

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

Agenda Item 3: Review of the terms of reference and working methodology of the CNS/ATM Subgroup

Agenda Item 4: Review to pending matters of the ATM/CNS/SG, ATM/COMM, CNS/COMM and respective Task Forces, for consideration in the CNS/ATM Subgroup work programme

Agenda Item 5: Review to the organization of the new CNS/ATM Subgroup work considering the performance-based approach projects methodology for the execution of the work programme

Agenda Item 6: Other matters

ii.6 **Schedule and Working Methods**

The Meeting agreed to carry out its working sessions from 0900 to 1500 hours, with appropriate breaks.

ii.7 **Attendance**

The Meeting was attended by 62 participants from 18 member States and 4 International Organizations Members of the CNS/ATM Subgroup.

ii.8 **Conclusions and Decisions**

The ATM/CNS Subgroup records its activities in the form of Draft Conclusions, Draft Decisions, and Decisions, as follows:

Draft Conclusions: *Conclusions that require approval by GREPECAS prior to their implementation.*

Draft Decisions: *Decisions that require approval by GREPECAS prior to their implementation*

Decisions: *Decisions that deal with matters of concern to the ATM/CNS Subgroup and its Committees.*

ii.9 **List of Draft Conclusions**

NUMBER	TITLE	PAGE
CNS/ATM/1-2	Adoption of performance monitoring and measurement programme for the CAR/SAM regions	2-4
CNS/ATM/1-3	Follow-up, participation and cooperation to ICAO RLA/03/902 regional project	2-7
CNS/ATM/1-4	Adoption of the CAR/SAM ATFM Manual	4-4
CNS/ATM/1-5	Collection of information on existing and future avionics in the CAR/SAM Regions	4-8
CNS/ATM/1-6	Proposed routing scheme for IPv4 for inter and intra regional communications links for ATN ground to ground applications	4-9
CNS/ATM/1-7	Improvements to the activities referred in ADS-B trials	4-10
CNS/ATM/1-8	Implementation of the new flight plan format in the CAR/SAM Regions	4-15
CNS/ATM/1-10	Training for aeronautical professional competence	6-3
CNS/ATM/1-11	GNSS Training	6-4

ii.10 List of Decisions

NUMBER	TITLE	PAGE
CNS/ATM/1-1	Regional Performance-based implementation Plan for the South American Region	2-3
CNS/ATM/1-9	Revision of the work programme of CNS/ATM Subgroup projects	5-1

LIST OF PARTICIPANTS / LISTA DE PARTICIPANTES

Argentina

Juan Daniel Lehmann
Jorge Roberto Cornelio
Víctor Marcelo De Virgilio
Obdulio Omar Gouarnalusse

Barbados

Mitchinson H. Beckles
Cedric H. Murrell

Bolivia

Jaime Yuri Alvarez Miranda
Reynaldo Cusi Mita

Brazil/Brasil

Normando Araujo de Medeiros
Ary Rodrigues Bertolino
Jorge Wilson de Avila Ferreira Penna
Julio César de Souza Pereira
Athayde Vieira Frauche
André Eduardo Jansen
Nilton de Faría
Cecília Dias Lima
Ricardo Luiz Dantas de Brito

Chile

Ricardo Bordalí

Colombia

Harlen Mejía
Diana Araque

Costa Rica

Steve Solano Bolaños
Kenneth Jackson León

Cuba

Fidel Ara Cruz
Carlos Pérez Saavedra

Dominican Republic/ República Dominicana

Julio César Mejía Alcántara
Rafael Abreu Díaz

Guatemala

Rolando Girón Alvarado
Carlos Augusto Lara Santos

Jamaica

Noel Ellis
Carl Gaynair

Nicaragua

Saiman A. Morales

Panamá

Ricardo Alberto Deville
Abdiel Vásquez

Paraguay

Silvia Carolina Maciel Oviedo
Ramón Salinas Ruiz

Peru

Raymundo Hurtado Paredes
Gino Defilippi Brigneti
Luis Perales Sáenz
Arturo Cordova Pacheco
Miriam Valverde Marina
Enrique Escalante Marcotti
Jose Luis Paredes Dávila
Víctor Tataje Contreras
Antonino Márquez Rondón

Trinidad and Tobago/ Trinidad y Tabago

Verónica Ramdath
Samuel Lampkin

United States/Estados Unidos

Michael Lam
Diane Bodenhamer
George (Joe) Hof
Dulce M. Rosés
Robert Novia

Uruguay

Juan Prada
Rosana Baru
Juan María Barla Arrúa
José Fernández Novelli

ARINC

Angel López Lucas

COCESNA

Uriel Urbizo Fley
Mauricio Matus

IATA

Manuel (Manny) Góngora
Demetrius Zuidema
Jerry Walker

IFATCA

Alex Figuereo

LIST OF DOCUMENTATION

WORKING PAPERS

Number	Agenda Item	Title	Prepared and Presented by
WP/01	--	Tentative Agenda, Schedule and Proposed Working Methods	Secretariat
WP/02	1	Review and update of outstanding GREPECAS conclusions/decisions concerning the ATM and CNS areas	Secretariat
WP/03	1	Review of ATM and CNS deficiencies	Secretariat
WP/04	4	ICAO regional database (ICARD): Five-letter name-code (5LNC) and route designators applications	Secretariat
WP/05	2	NAM/CAR regional plan for the implementation of performance-based air navigation	Secretariat
WP/06	2	Transition plan towards ATM operational concept	Secretariat
WP/07	2	CNS/ATM implementation activities in the SAM Region	Secretariat
WP/08	3	Proposals on the methodology and functional structure of the new CNS/ATM Subgroup	Secretariat
WP/09	4	Update of performance objectives and ATM operational implementation scenario	Secretariat
WP/10	4	PBN implementation in the CAR/SAM Regions	PBN Task Force Rapporteur
WP/11	4	Report of the GREPECAS ATM/CNS SUBGROUP ATM Committee Air Traffic Flow Management (ATFM) Task Force (ATFM/TF/5). ATFM Task Force Developments	ATFM Task Force Rapporteur
WP/12	4	Report of the Scrutiny Working Group	Scrutiny Working Group Rapporteur
WP/13	4	Follow-up on the implementation of the work programme of the CNS Committee and presentation of pending CNS activities	Secretariat
WP/14	4	Report of the fourth meeting of the GNSS Task Force (GNSS/TF/4)	GNSS Task Force Rapporteur
WP/15	4	Report of the fifth ATN Task Force meeting (ATN/TF/5)	ATN Task Force Rapporteur
WP/16	4	Report of the Surveillance Task Force (SUR/TF)	Surveillance Task Force Rapporteur
WP/17	4	ICAO guidance material on the new flight plan format and follow-up on its implementation in the CAR/SAM Regions	Secretariat
WP/18	5	Performance monitoring and measurement	Secretariat
WP/19	5	SAR performance framework	Secretariat
WP/20	5	Future work proposal for the CNS/ATM Subgrop	Secretariat
WP/21	6	ICAO Training Guides for Developing the Competencies of Aeronautical Professionals	Secretariat
WP/22	6	Quality Assurance Manual on Search and Rescue Services	Secretariat
WP/23	4	Follow-up to MEVA II / REDDIG interconnection	Secretariat
WP/24	4	Follow-up of actions in the CAR/SAM Regions in support of the ICAO position at the 2012 World Radiocommunication Conference (WRC-2012)	Secretariat
WP/25	4	Analysis of DME/DME Navigation Infrastructure in support of PBN	Spain

Number	Agenda Item	Title	Prepared and Presented by
WP/26	4	Combined use of SBAS and GBAS to minimise problems in the ionosphere during precision approaches	Spain
WP/27	2	Use of ADS-B at Macaé – Cuenca de Campos TMA	Brazil
WP/28	2	Brazilian GBAS programme update	Brazil
WP/29	2	Monitoring of the ionospheric activity	Chile
WP/30	2	Experience of Chile DGAC in the implementation of a GBAS system	Chile
WP/31	2	ADS-C/CPDLC operation in the Atlantic ACC	Brazil
WP/32	2	Air navigation evolution forecast at Habana FIR	Cuba
WP/33	2	Activities carried out by the Brazilian administration for PBN implementation	Brazil
WP/34	4	RLA/03/902 Project – SACCSA Phase III	Spain
WP/35	4	Proposed Inter-Regional Strategy for Implementation of Amendment 1 to PANS-ATM, 15th Edition	United States
WP/36	4	Plans for Federal Aviation Administration packet switched network (X.25) decommissioning	United States
WP/37	6	Development of file server in support of international satellite communication system	United States
WP/38	4	Socializing and taking self conscious to all aircraft operators about the Navigation System Action Plan focusing on the evolution and use of GNSS	Colombia
WP/39	4	Socializing and taking self conscious to all aircraft operators about the AFS (Aeronautical Fixed System) and AMS (Aeronautical Mobile System) Communications System Action Plan focusing on the evolution and use of the new technologies	Colombia
WP/40	2	Follow-up, coordination and co-operation regarding Phase III of the RLA/03/902 – SACCSA project linked to the GNSS regional implementation	Project Coordinator, TCB - ICAO
WP/41	2	Results of the GNSS advanced Seminar / Workshop of the RLA/03/902 – SACCSA project held in Costa Rica, April 2009	Project Coordinator, TCB – ICAO
WP/42	4	Safety Assessment Post-Implementation of RVSM at the Caribbean and South American Airspace – CAR/SAM – Statistical/Mathematical Analysis – Monitoring Phase IV	RVSM/RNP Working Group

INFORMATION PAPERS

Number	Agenda Item	Title	Prepared and Presented by
IP/01	--	General Information *(Revised No. 3)*	Secretariat
IP/02	--	List of working and information papers *(Revised)*	Secretariat
IP/03	2	Nuevo simulador ATC en Cuba (*Spanish only*)	Cuba
IP/04	6	Cursos Ofrecidos por el Centro de Gestión de Navegación Aérea (CGNA) (*Spanish only*)	Brazil
IP/05	2	Plan PBN para corto y mediano plazo en Chile (*Spanish only*)	Chile

Number	Agenda Item	Title	Prepared and Presented by
IP/06	4	CNS SARPS updating and future work of the ICAO panels of experts (*Spanish only*)	Secretariat
IP/07	4	Perspectivas Futuras del Sistema Integrado de Gestión de Movimientos Aéreos (SIGMA) (*Spanish only*)	Brazil
IP/08	2	Gulf of Mexico RNAV Route Project	United States
IP/09	2	Actividades realizadas por la Administración Brasileña para la Implantación del AMHS (*Spanish only*)	Brazil
IP/10	2	The Federal Aviation Administration Surveillance Broadcast Services Program	United States
IP/11	6	Air traffic controllers worldwide shortage	IFATCA
IP/12	2	Bulletin No. 1 of the RLA/03/902 – SACCSA Project	Project Coordinator, TCB - ICAO

FLIMSIES

Number	Agenda Item	Title	Prepared and Presented by
FL/01	2	CAR/SAM Implementation plan	Ad-hoc Group

Agenda Item 1: **Follow up to valid CNS- and ATM-related conclusions and decisions adopted by GREPECAS and reviewed by the ANC. Analysis to the status of CAR/SAM CNS and ATM air navigation deficiencies**

CNS and ATM valid conclusions and decisions adopted by GREPECAS

1.1 The Meeting examined the updating proposed to the list of valid GREPECAS conclusions and decisions in the ATM and CNS areas, shown in **Appendix A** to this Agenda Item.

1.2 The Meeting took note that the list of revised conclusions will be presented by the CNS/ATM Secretariat to GREPECAS/16 meeting.

Analysis to the status of CAR/SAM CNS and ATM air navigation deficiencies

1.3 The Meeting examined the status of type A, B and U deficiencies in the ATM and CNS areas of the CAR/SAM Regions. **Appendix B** to this Agenda Item presents updated information.

1.4 During the analysis of the deficiencies, Brazil informed of its communications to the ICAO SAM Regional Office on the change of requirements in the CAR/SAM Air Navigation Plan (FASID Table CNS 3); reason for which it was agreed upon that deficiencies CNS19 and CNS23 corresponding to the SAM Region would be considered as finalyzed.

APPENDIX A

VALID GREPECAS ATM AND CNS CONCLUSIONS/DECISIONS AND ANC ACTION

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 13/53	**INFORMATION REQUEST ON AIRCRAFT CAPABILITY TO OPERATE SSR IN MODE S, ADS AND ADS-B**	That ICAO, a) request information from IATA on their airlines members capability to operate with Mode S transponders with elementary and enhanced capacity, as well as with ADS and ADS-B; and b) collect information from the States/Territories/International Organizations on the existing and planned ATC automation systems capabilities to support ADS-B systems.	ICAO requested IATA this information, including other avionics equipment. At ATM/CNS/SG/5 meeting, IATA presented preliminary information on the subject. AT SUR/TF/3 meeting, IATA also presented a new format to collect CNS-related avionics information, which includes a global data base on this topic. Once concluded, the information in this data base will provide complete information on the avionics systems installed on board aircraft. RLA/98/003 carried out a study on automation systems in the SAM States and in COCESNA, thus collecting the information required in item b). CNS/ATM/SG/1 meeting considered that the request for information on aircraft capability to operate SSR Mode S, as well as ADS and ADS-B, should be extended to include request for information on all CNS avionics equipment installed on board aircraft.	ICAO	Information on IATA airlines capability to operate with Mode S transponders, with elementary or enhanced capacity, as well as with ADS and ADS-B. Information on the existing and planned ATC automation systems capabilities to support ADS-B systems in CAR/SAM States/Territories /International Organizations	Not analyzed by the ANC	Superseded by draft Conclusion CNS/ATM/1-4

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 13/74 D	**PROPOSAL OF AMENDMENT TO ATN REGIONAL PLAN**	That ICAO consider the amendment to the ATN Regional Plan contained in the FASID Table CNS/1B, by replacing that table format with the following: • Table CNS 1Ba – CAR/SAM regional Plan of ATN routers • Table CNS 1Bb – CAR/SAM regional Plan of ground-ground applications • Table CNS 1Bc – CAR/SAM regional Plan of air-ground applications *Note: -The proposed Tables CNS 1Ba and CNS 1Bb formats are shown in Appendices AY and AZ respectively. The Table CNS 1Bc would be developed by the CNS Committee soon.*	As follow-up to the amendment to the ATN Regional Plan, we have: Table CNS 1Ba – Routers Regional Plan: There is a revised version (June2009). Table CNS 1Bb – CAR/SAM ATN ground-ground applications plan: There is a revised version (August 2008). Table CNS 1Bc – CAR/SAM ATN ground air applications plan: there is a format proposal (GREPECAS/14). The ATN regional plan, Tables CNS 1Ba and 1Bb, will be examined/updated in 2010 and the corresponding amendment process will be made. The CAR/SAM ATN ground air applications plan (Table CNS 1Bc) would be ready by CNS/ATM/SG/2 meeting. Tables CNS 1BA and 1Bb are available. Table CNS 1Bc will be available by December 2011.	ICAO	Amendment to FASID: Tables CNS 1Ba, CNS 1Bb and CNS 1Bc	Not analyzed by ANC	December 2011

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 13/79 **D**	**DEVELOPMENT OF NATIONAL PLANS TO PRIORITIZE THE AMHS AND AIDC IMPLEMENTATION AND CONTRIBUTE TO ATM AUTOMATION**	That the States/Territories/International Organizations develop their respective national plans for the prioritization of the AMHS and AIDC implementation, based on the ATN routers table, the ATN ground-ground applications plan, and the regional AMHS addressing plan, and relevant ATN – AMHS regional documentation, also contributing to the progress towards the development of ATM automation supporting air traffic services.	CAR/SAM States/Territories/ International Organizations should note that in the development of their performance based national plans, AMHS and AIDC implementation should be prioritized, on the basis of ATN router tables, ATN ground-ground applications plan, the AMHS addressing plan and regional documentation relevant to ATN AMHS. Within the NAM/CAM Regional Air Navigation Performance Based Implementation Plan, regional actions have been developed for AMHs and AIDC implementation. AMHS trials are being planned between United States (FAA) and various CAR/SAM States. Many CAR and SAM States have implemented AMHS systems (Argentina, Brazil, Chile, Colombia, Dominican Republic, Panama, Paraguay, Peru, Trinidad and Tobago and COCESNA). Implementation plans are scheduled for 2010 in Guyana, Suriname and Venezuela. In addition, MoU were drafted for the interconnection between some installed AMHS systems.	States/Territories/ International Organizations	National plans for AMHS and AIDC implementation	Not analyzed by ANC	December 2011
C 13/85 **D**	**FOSTER THE USE OF GNSS IN DIVERSE SECTORS OF THE STATES**	That States/Territories/International Organizations foster the use of GNSS in diverse sectors of their respective States and disseminate the results of the studies on the solution of SBAS.	Some States/Territories/ International Organizations have promoted the use of GNSS at various sectors in their respective countries. Studies for a SBAS system are under way. Consideration has been given to encouraging the cooperationa between national investigation and development entities, with the support of training centres (universities, other centres).	States/Territories/ International Organizations	That States promote, in their different sectors, the use of GNSS, and that they become aware of the results on SBAS augmentation studies.	Not analyzed by ANC	June 2011 Superseded by Draft Conclusion CNS/ATM/1-3

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 13/87 **D**	**ADS-B TRIALS PROGRAMME IN THE CAR/SAM REGIONS**	That, States/Territories/International Organizations in collaboration with the airspace users, establish and execute an ADS-B trials programme using the available technology and services, aimed at improving the ADS-B knowledge and evaluating the benefits for the Air Traffic Management in the CAR/SAM Regions.	Some CAR/SAM States/Territories/ International Organizations have carried out ADS-B trials. In the SAM Region, Chile and Perú have carried out ADS-B tests. In the CAR/NAM Region, ADS B tests have been carried out Cuba, Jamaica, Honduras (COCESNA) and United States. A document on considerations to be taken into account for ADS-B trials has been prepared, and approved by GREPECAS/15. Other trials are scheduled in the short and medium term in the CAR/SAM Regions.	States/Territories/ International Organizations	ADS B trials programme	Not analyzed by ANC	December 2011
C 14/51 **A, D**	**RE-ORGANIZATION OF WORK PROGRAMMES TO SUPPORT ATM PERFORMANCE OBJECTIVES FOR THE CAR/ SAM REGIONS**	That to support the transition from a system-based to a performance-based approach for the planning and implementation of air navigation infrastructure: a) CAR/SAM States/Territories/ International Organizations take the necessary action to develop and implement national ATM work programmes in accordance with the performance objectives of the ATM Committee; and b) ICAO continue coordination of the re-organization of CAR/SAM ATM Work Programmes in accordance with the new Global Plan Initiatives (GPIs), and in support of ICAO Strategic Objectives.	ICAO has proposed the performance based approach (PBA) which urges all States to formulate their air navigation national plans under this approach – GREPECAS Conclusion 15/1.Therefore, GREPECAS AGA, ATM, AIS, CNS and MET contributory bodies must reorganize their work programmes to achieve the agreed performance objectives, inasmuch in the ATM area as in other air navigation fields. The CNS/ATM/SG reorganized the ATM work programme in the CAR and SAM Regions, in accordance with the new Global Plan Initiatives (GPI) and in support of the ICAO Strategic Objectives, and satisfying the agreed upon performance objectives.	States/Territories/ International Organizations ICAO NACC and SAM Regional Offices	Implementation of harmonized CAR/SAM ATM performance based objectives. Alignment of ATM work programme with performance objectives and ICAO strategic objectives.	Took note and requested the Secretariat to continue providing guidelines to the Regions for the formulation of regional performance objectives	a) This item is proposed to be superseded by GREPECAS Conclusion 15/1 b) Completed.

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 14/54 **D**	**COMMUNICATION ASPECTS FOR THE MIGRATION TOWARDS THE METEOROLOGICAL MESSAGE EXCHANGE IN BUFR CODE**	That the ATN Task Force of the CNS Committee, as well as the COM/MET Task Force of AERMET Subgroup, analyse in detail the following communication aspects considered necessary for the migration towards the meteorological message exchange in BUFR format in the CAR/SAM Regions for possible implementation for first and second transition stages: a) use of terminals with coding/decoding capacity; b) use of AMHS systems with extended service; and c) development of an Interface Control Document (ICD) to integrate AMHS and MET systems, establish standards for presentation systems and specifications for the conversion of templates and security aspects.	During GREPECAS/15, it was indicated that ANC, had approved to suspend the migration to BUFR code until studies on XML use of OPMET Exchange are completed by the WMO Group of Experts. In view of this situation, this conclusion is proposed as completed.	ATN/TF and COM/MET/TF	Analysis of communications aspects considered necessary for migration towards the Exchange of meteorological messages in BURF format in the CAR/SAM Regions.	Not analyzed by the ANC	Completed
C 14/56 **D**	**PROGRESSIVE DEACTIVATION OF NDB STATIONS**	That in order to develop progressive deactivation of NDB Stations without affecting safety, States, Territories, International Organizations and airspace users: a) analyse the service provided by each NDB station, its function, procedural existence with other aids such as VOR/DME, GNSS-RNAV, as well as the aircraft capacity/development that operate in serviced airspace; b) based on the analysis described in item a) above and in the Table format included in the Appendix AF to this part of the Report, develop a plan for the progressive deactivation of NDB stations; and c) inform the corresponding ICAO NACC or SAM Regional Office regarding their respective plan for the progressive deactivation of NDB stations before 30 November 2007.	CAR/SAM States/Territories/ International Organizations have informed of their plans for the progressive deactivation of NDB stations	States/Territories/ International Organizations and airspace users	Plans for progressive deactivation of NDB stations	Noted	December 2008 Completed

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
D 14/57	**DEVELOPMENT OF A REGIONAL PLAN FOR THE PROGRESSIVE DEACTIVATION OF NDB STATIONS**	That the CNS Committee: a) prepare a regional plan for the progressive deactivation of NDB stations, taking into account the responses received from States, Territories, International Organizations and airspace users, Conclusion 14/X and the Table presented in the Appendix AF to this part of the Report; and b) based on the results of item a) above, propose the corresponding amendments to Table CNS 3 of the FASID.	Taking into account the plan for the progressive deactivation of NDB stations prepared by States/Territories, a CAR/SAM deactivation plan was established, which was included in FASID Table CNS 3, carrying out the corresponding proposal for amendment	GREPECAS CNS Committee	NDB stations regional deactivation plan	Noted.	2009 Completed

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 15/1 **D**	**DEVELOPMENT OF PERFORMANCE BASED REGIONAL AND NATIONAL PLANS**	That, a) GREPECAS develop a performance-based regional plan in accordance with the Global Air Navigation Plan and the Global ATM Operational Concept. This plan should include identification of regional performance objectives and completion of performance framework forms for all air navigation areas such as ATM, CNS, AIM, MET and AGA/AOP; and b) States, Territories and International Organizations, taking into account user needs, develop performance-based national plans in accordance with the regional performance objectives included in the Regional Air Navigation Plan. These national plans should encompass identification of national performance objectives and completion of performance framework forms for all air navigation areas such as ATM, CNS, AIM, MET and AGA/AOP.	Identify regional performance objectives in the ATM and CNS fields. In 2009, the NACC and SAM Regional Offices held workshops on the elaboration of a national performance framework for air navigation systems. Within the NAM/CAR working groups, various performance objectives have been identified and extended through the C/CAR and E/CAR working groups, including same in the NAM/CAR Performance Based Air Navigation Implementation Plan. Coordination with States/Territories and International Organization s to develop national plan son the basis of regional performance objectives. Many CAR/SAM States have drafted their national plan on the basis of performance objectives. CNS/ATM/SG/1 meeting decided it would not be necessary a CAR/SAM regional plan. The SAM Region will draft its regional performance based air navigation implementation plan. Harmonization tasks will be carried out at the CNS/ATM/SG.	GREPECAS States/Territories and international organizations	Performance based Regional AN Plan Performance based National AN plans	Noted and that GREPECAS and States are requested to take into account the user expectations in the development of performance framework forms.	a) GREPECAS/ 16 b) December 2010
C 15/4 **D**	**D-VOLMET AERONAUTICAL DATA LINK REQUIREMENTS IN THE CAR/SAM REGIONS**	That the ICAO NACC and SAM Offices, in coordination with the ICAO SAM Office, amend Part VII Vol. I – ATS of the ANP to reflect the requirement for D-VOLMET aeronautical data link services in the CAR/SAM Regions.	The AERMET/SG, upon analyzing D-Volmet implementation in the CAR/SAM Regions, proposes an amendment in ANP Volume I Basic, Part VII ATS.	ICAO NACC and SAM RO	Amendment to ANP Vol I – Basic, Part VII-ATS	Not analyzed by the ANC	End of 2010

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
D 15/34 **D**	**NEW CNS/ATM SUBGROUP**	That, in line with GREPECAS efforts to improve the treatment of ATM and CNS matters and the coordination required between these areas to ensure a performance-based approach to planning of a global ATM system, a re-engineering of the ATM/CNS Subgroup be carried out within the GREPECAS mechanism with the creation of the new CNS/ATM Subgroup and Terms of Reference as presented in **Appendix G** to Agenda Item 5 of this Report.	Coordination between the ATM and CNS Secretariat. CNS/ATM/SG/1 meeting analyzed and approved the structure of the new ICAO CNS/ATM Subgroup.	GREPECAS Secretariat	New CNS/ATM Subgroup with its terms of reference		Completed

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 15/35 **D**	**IMPLEMENTATION OF THE NEW ICAO FLIGHT PLAN MODEL**	Considering that States should take measures to implement the new ICAO flight plan model pursuant to Amendment No. 1 to the 15th Edition of the PANS-ATM (Doc 4444), and in order to establish a regional strategy to facilitate global implementation of this amendment that: a) based on the guidance material to be prepared by ICAO, CAR/SAM States/Territories and International Organizations take the necessary measures to prepare for the transition to the new flight plan model; and b) the Subgroup establish a contributory body to develop a regional strategy for the transition to the new flight plan model in the CAR/SAM Regions and the provisions associated with ATS messages.	Coordination between ICAO and States/Territories/International Organizations through meetings, missions and letters for the adoption of measures on the transition to the new flight plan. On the basis of directives for the implementation of Amendment No. 1 to PANS-ATM (Doc 4444), 15th Edition (ICAO Secretary General State letter AN 13/2.1-09/9) of 6 February 2009) : a) In the CAR Region, the E/CAR/WG elaborated a proposal PFF as an action plan to follow for this transition. b) In the SAM Region, an initial implementation strategy for the transition towards the new flight plan model was drafted. SAM/IG/4 meeting (19-23 October 2009) analyzed this strategy and considered it appropriate. CNS/ATM/SG/1 meeting approved the strategy and performance objective towards the transition to the new flight plan model, and a contributory body was established to monitor implementation Progress.	a) CAR/SAM States/Territories and International Organizations b) CNS/ATM/SG	Regional strategy for the implementation of a new ICAO flight plan model	Recognizing that many of the regions are progressing at a different pace for migration to new ICAO flight plan, the Commission reiterated the need for global coordination by ICAO HQ so as to ensure smooth transition at regional and national levels.	a) November 2012 b) Completed

Conc/Dec and Strategic Objective(s)	**Title of Conclusion/ Decision**	**Text of Conclusion/Decision**	**Proposed Follow-up**	**Responsibility**	**Deliverable**	**Action by ANC**	**Reporting/ Completion Date**
C 15/36 **D**	**MEASURES TO REDUCE OPERATIONAL ERRORS IN THE ATC COORDINATION LOOP BETWEEN ADJACENT ACCs**	That taking into account the impact of operational errors in the ATC coordination loop between adjacent ACCs on air operations safety: a) CAR/SAM States/Territories/ International Organizations apply, on an urgent basis among other measures, the programme for the prevention of errors in the coordination loop between adjacent ACCs described in Appendix F to this part of the Report in order to reduce LHDs caused by errors in traffic coordination messages between ATC units to achieve an acceptable target level of safety; b) CAR/SAM States/Territories/International Organizations gradually implement the interface for data exchange among ATC units (AIDC); and c) ICAO coordinate, provides assistance, and conduct follow-up on the implementation of these corrective measures.	Coordination with States by ICAO Regional Offices Lima and Mexico. Various measures have been discussed through CAR and SAM bilateral and multilateral meetings. In addition, the Scrutiny Working Group (GTE) and CARSAMMA carry out bi-annual evaluations of the reported LHDs. ICAO NACC and SAM Regional Offices have provided assistance and sent a letter to States for application of this conclusion. AIDC implementation is contemplated in States National Plans (See Conclusion 13/79).	a) and b) States/Territories/ International Organizations c) ICAO	ATC coordination error reduction through: Error-preventing programme in the coordination loop between adjacent ACCs. AIDC Implementation	Noted and supported the idea of remedial actions such as implementation of AIDC. Also, agreed that ICAO should provide all the necessary support to States in the regions to implement the corrective measures.	Completed
C 15/37 **D**	**REVIEW OF THE METHODOLOGY USED FOR SAFETY ASSESSMENT**	That ICAO review the methodology used for conducting post RVSM implementation safety assessments considering the fact that type M and N errors identified and used to perform this assessment may not be related to RVSM implementation.	The Air Navigation Commission agreed that the M and N errors should be taken into account in the evaluation of safety.	ICAO Regional Office, Lima ICAO HQ ANB/ATM	Issue form sent to HQ New methodology to assess LHD.M and N errors	Did not agree with the view of GREPECAS and reiterated that the Secretary General should take into account all types of errors in the RVSM airspace, including the M and N during the evaluation of the risk.	Completed

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 15/38 **A, D**	**NATIONAL PBN IMPLEMENTATION PLANS**	That in order to initiate PBN implementation and in accordance with Resolution 36/23, CAR/SAM States/Territories: a) develop their PBN national implementation plans by December 2009, and present them to the corresponding Regional Offices; b) consider using the PBN action plans models presented in Appendix G to this part of the Report as guidance material; and c) designate a Point-of-Contact who will coordinate PBN implementation activities in each State/Territory.	Coordination with States by ICAO Regional Offices Lima and Mexico. The NAM/CAR performance based air navigation implementation plan has been drafted. Action plans have been developed for the Central America, Habana, Miami, San Juan, Mexico, Santo Domingo and Piarco FIRS, and PBN procedures have been implemented in various CAR international airports. In the SAM Region, PBN implementation action plans have been drafted. Contact points for the coordination of PBN implementation activities have been assigned. Argentina, Bolivia, Brazil, Chile, Colombia, Guyana, Paraguay, Peru and Uruguay have presented their national PBN implementation plans, in follow-up to the SAM region al programme.	States	National PBN Implementation Plans using the models provided. Point of contact for each State/Territory	Noted	Completed
C 15/39 **A, D**	**ADOPTION OF STRATEGIC LATERAL OFFSET PROCEDURES (SLOP)**	That, recognizing that Strategic Lateral Offset Procedures (SLOP) may provide safety enhancements in the CAR/SAM Regions, ICAO take the necessary measures to initiate an amendment to Doc 7030, based on the PANS-ATM (Doc 4444), for the application of SLOP in areas where route separation is at least 30 NM and no ATS surveillance system coverage exists (i.e., radar, ADS-B, etc).	Proposal for amendment on Strategic Lateral Offset Procedures in process and under coordination with ICAO HQ.	ICAO Regional Office, Lima ICAO Regional Office, Lima ICAO HQ ANB/ATM	Issue form sent to HQ Amendment to DOC 7030 concerning Application of SLOP in areas where route separation is at least 30 NM	Agreed with the proposal and requested the Secretary General to take the necessary measures for the application of SLOP in areas where route separation is at least 30 NM	Completed

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 15/40 **D**	**SEMINAR/WORKSHOP ON THE IMPLEMENTATION OF AIR-GROUND DATA LINKS AND THEIR APPLICATIONS**	In order to support the study of a plan to conduct air-ground data links transmission trials and the functionalities or applications implemented through such links, ICAO is urged to organize and conduct a seminar/workshop on this topic the last quarter of 2009.	Event carried out in Santo Domingo, Dominican Republic, 23-27 November 2009, which counted with participation of 70 delegates from NAM/CAR/SAM and EUR States.	ICAO Regional Offices Lima and Mexico	Seminar concluded	Noted and requested the Secretariat to conduct such workshops on a global basis.	November 2009 Completed
C 15/41 **D**	**AMENDMENT TO THE REGIONAL AIR NAVIGATION PLAN – TABLE CNS/3 OF FASID**	That ICAO consider amending the format of the Regional Air Navigation Plan FASID Table CNS 3 by adding a new column under GNSS requirements to reflect the planning of ABAS requirements as shown in the Appendix N to this part of the Report.	Activity carried out through the approval of amendment to ANP, Vol II – FASID, Table CNS 3 (July 2009).	ICAO Regional Office, Lima ICAO Regional Office Lima and ICAO HQ ANB/CNS	Issue form sent to HQ Submission of the proposal to HQ Approved amendment	Concurred with GREPECAS and requested the Secretariat to amend the format of the Regional Air Navigation Plan, FASID, Table CNS 3 accordingly.	Completed
C 15/42 **D**	**AVAILABILITY OF GNSS RECEIVERS FOR PROJECT RLA/03/902 IONOSPHERIC ANALYSES AND STUDIES**	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 15 July 2009,** 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.	Letter to States/Territories and International Organization as to the requirement.	States/Territories/ International Organizations	Information on GNSS receivers with L1 and L2 data collection capacity	Not analyzed by ANC	July 2009 Completed

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 15/43 **D**	**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 SBAS; • that the proposed ionospheric studies are of considerable importance for gaining knowledge and characterizing actual behaviour for consequent implementation/planning of the GNSS solution; and • the importance of having CAR/SAM States willing to participate in Phase III of RLA/03/902 SACCSA for the efficient completion of the project; ICAO is requested to circulate, as soon as possible through its Regional Offices, a letter to States/Territories/International Organizations, asking them to identify by 31 December 2008, whether or not they are interested in participating in Phase III of project RLA/03/902 - SACCSA in order to determine those interested in conducting Phase III and making a decision in this regard.	Letter to States/Territories and international organizations requesting information. Letter to States/Territories and international organizations on result of consultation.	ICAO Regional Offices Lima and Mexico	Information from States/ territories and international organizations on their participation in Project RLA/03/902 SACCSA, Phase III	Noted	June 2009 Completed

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 15/44 **D**	**USE OF GNSS IN THE SHORT-TERM**	In order to comply with the implementation of the CAR/SAM PBN Roadmap, States/Territories/International Organizations are urged to complete the development and approval of GPS-based NPA operations, establishing regulations and procedures (NOTAM, AIC, etc.) for the use of RAIM GPS and Baro-VNAV GPS in the short-term.	Letter to States/Territories, meetings and missions. These considerations have been included in the objectives of the NAM/CAR performance based Air Navigation Plan and in the SAM PBN implementation action plans. The CAR/SAM Regions have drafted Advisory Circulars (AC) relative to aircraft and user approval for RNAV 10 operations (named and authorized as RNP 10), RNAV 5, RNAV 1, RNAV 2, basic RNP 1, RNP APCH, RNP AR APCH and APV/baro-VNAV.	States/Territories and International Organizations	Approval of GPS based NPA operations	Not analyzed by the ANC	December 2010
C 15/45 **D**	**REVIEW OF THE PLAN FOR THE PHASE-OUT OF NDB STATIONS**	That States/Territories/International Organizations review and complete the information contained in the Regional Plan for the Phase-out of NDB Stations in the CAR and SAM Regions that appears in **Appendix O** to this part of the Report and send missing information to the respective ICAO Regional Offices before **15 July 2009.**	Letter to States/Territories/ International Organizations	States/Territories/ International Organizations	Complete NDB deactivation regional plan	Not analyzed by ANC	Completed

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
C 15/46 **D**	**CAR/SAM REGIONAL ACTION FOR THE PREPARATION AND SUPPORT OF THE ICAO POSITION FOR WRC-11**	That CAR/SAM States and International Organizations, in preparation and support of the ICAO position for the ITU World Radio Communication Conference – 2011 (WRC-11): 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 contact 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 analyze 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.	Letter to States/ Territories and International organizations. Within the NAM/CAR performance based Air Navigation Plan, a new performance objective has been included for the follow-up of this task. In the SAM Region, an action plan to prepare for the ICAO position at WRC-12 has been prepared. Also, CAR/SAM contact points have been assigned. The Regional NAM/CAR/SAM Preparatory Meeting (RNCSPM) for ITU WRC-2012 will be carried out in Mexico City, Mexico, from 21 to 22 April 2010, which will count with the presence of the Secretariat of the Aeronautical Communications Panel (ACP) Working Group F (ACP-WG/F).	States/Territories/ International Organizations	a) Support from States and international organizations on the ICAO position at WRC-11 through submission of progress reports. b) Nominate focal points for WRC-2012 c) Active participation in CITEL meetings. d) Active participation in ICAO meetings on WRC-2012. e) Participate in WRC-2012. f) Recommend other measures.	Noted and requested the Secretary General to urge States to continue to participate at various levels in different fora to provide support for the ICAO position.	WRC-2012

Conc/Dec and Strategic Objective(s)	Title of Conclusion/ Decision	Text of Conclusion/Decision	Proposed Follow-up	Responsibility	Deliverable	Action by ANC	Reporting/ Completion Date
D 15/49 D	**ASPECTS TO BE CONSIDERED IN DEVELOPING THE WORK PROGRAMMES OF GREPECAS CONTRIBUTORY BODIES**	That, in developing the work programmes of the GREPECAS contributory bodies, the following aspects be considered: a) the related strategic objective; b) the contribution made to achieve that strategic objective; c) other relevant tasks in the overall programme of GREPECAS contributory bodies; d) the relationship to the Regional Air Navigation Plan and/or SARPs implementation; *Note: Until the new Regional Air Navigation Plan is developed, GREPECAS Contributory Bodies should refer tasks to Global Plan Initiatives (GPIs).* e) detail specific deliverables into the work programme in order to clarify understanding of the expected results; and f) identify the completion date of the task.	The drafting of the new Subgroup's work programme, as well as of the contributory bodies that might be established, took into account these aspects.	CNS/ATM/SG	Work programme of CNS/ATM/SG and of possible contributory bodies to be established through the inclusion of the aspects indicated in this Decision.	Not analyzed by the ANC	Completed
D 15/53 D	**NEW FORMAT FOR GREPECAS CONRIBUTORY BODIES WORK PROGRAMME**	That GREPECAS contributory bodies: a) use the format included as Appendix H to this part of the Report to present their work programmes to GREPECAS; and b) use the format included as Appendix I to this part of the Report to be reviewed by the ACG.	The format in Appendices H and I was used to represent the work programme to GREPECAS and ACG, respectively.	CNS/ATM/SG Secretariat	CNS/ATM/SG work programme	Not analyzed by the ANC	Completed

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
BHS Bahamas										
ATM 18 CAR	Use of the aeronautical phraseology	Bahamas	In general, the use of aeronautical phraseology in English does not meet the required levels and it is a relevant factor with regard to ATS incidents.	SEP/ 2000	ATS/SG/9, RO ATM/SAR mission in April 2005.	A	Continuous training and supervision in the use of aeronautical phraseology is required, in accordance with what is stated in Doc 4444 PANS-ATM. Bahamas is implementing the ICAO SARPs.	CAA Bahamas	MAR/ 2009	The Bahamas is in the process of converting to complete ICAO procedures and phraseology.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
SLV El Salvador										
ATM 8 CAR	English proficiency in Air Traffic Services CAR/SAM/3 Rec. 5/35	El Salvador	The proficiency in the English language of some ATC units is below the desired level and could be a contributing factor for the ocurrence of incidents and/or aeronautical accidents.	OCT/ 1995	GREPECAS/5. Collaborative actions have been taken with other states for the recurrent training in the English language of air traffic controllers.	A	a) In order to reach and maintain the English language level required, the State shall establish a permanent and continuous training plan of ATC units, which contemplates the follow-up of the improvements of personnel of ATC units. b) The State shall demand the personnel who works in ATC units, the English language knowledge in compliance with ICAO Annex 1.	CAA El Salvador	MAR/ 2010	Continuous training in the use of aeronautical phraseology is provided by ICCAE.
ATM 24 CAR	Use of the aeronautical phraseology	El Salvador	In general, the use of aeronautical phraseology in Spanish and/or English does not meet the required levels and it is a relevant factor with regard to ATS incidents.	SEP/ 2000	ATS/SG/9. Recurrent courses for the use of aeronautical phraseology for air traffic controllers have been implemented.	A	Continuous training in the use of aeronautical phraseology is provided by ICCAE.	CAA El Salvador	MAR/ 2010	

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
GRD Grenada										
ATM 25 CAR	Use of the aeronautical phraseology	Grenada	In general, the use of aeronautical phraseology in English does not meet the required levels and it is a relevant factor with regard to ATS incidents.	SEP/ 2000	ATS/SG/9	A	Continuous training and supervision in the use of aeronautical phraseology is required.	ECCAA	MAR/ 2010	a) CAA carries out periodic ATC unit inspections b) continuation of the process of legislative implementation with respect to language proficiency.

OUTSTANDING DEFICIENCIES

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
GTM Guatemala										
ATM 68 CAR	Annexo 11, Doc 4444, Chap. 2	Guatemala	Lack of ATS safety management in the La Aurora and Las Flores international airports.	SEP/ 2007	ICAO Visit 2007	A	Implement an ATS safety management programme at the La Aurora and Las Flores international airports including: establelish the quantity of qualified ATS personnel to perform regulatory and ATS safety oversight duties ; foster specialized ATS personnel training in order to comply with these duties; develop an ATS safety programme with preventive measures to prevent runway incursions; coordinate, publish and diffuse widely among all the ATS and aerodrome operations personnel the operational and vehicle and persons circulation procedures within the aerodrome manoeuvering area.			
ATM 69 CAR	Doc 7300, Anexo 11, Doc 4444, Doc 9426	Guatemala	Lack of information on air traffic services(ATS) capacity	SEP/ 2007	ICAO visit 2007	A	Develop a study on demand and capacity of air traffic services (ATS) including determine the quantity of required ATC work positions; determinare the quantity of required ATC personnel to cover properly the ATS work positions; determinae the quantity of administrative support personnel for ATS; and determine the required specialized personnel for the provision of ATFM service.			
ATM 70 CAR	Annex 3; Annex 11, Doc 4444	Guatemala	Lack of operational ATS - MET agreeement for the corresponding service	SEP/ 2007	Develop, in coordination with the corresponding authorities the establishment of an ATS/MET agreement and adequate procedures allowing to provide MET assustance regarding ATS.	A				

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
HTI Haiti										
ATM 5 CAR	Provision of Aerodrome Control Services	Haiti/Cap. Haitien Aerodrome	Aerodrome control services are not provided at Cap. Haitien Aerodrome	MAY/ 1998	Mission to the State NACC Office	A	Aerodrome control services should be provided at Cap. Haitien	CAA Haiti	DEC/ 2003	The first stage is to keep flight information in Cap Haitien airport in the mid term and make the necessary changes. This project is on-going, and meanwhile work is done for a new airport project.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
HND Honduras										
ATM 10 CAR	English proficiency in Air Traffic Services CAR/SAM/3 Rec. 5/35	Honduras	The proficiency in the English language of some ATC units is below the desired level and could be a contributing factor for the ocurrence of incidents and/or aeronautical accidents.	OCT/ 1995	GREPECAS/5	A	a) The required English language evaluation was carried out and effectively, its was noted that 60% of the Air Traffic Controllers presented the deficiency. b) It has been required to ensure that the recruitment of new personnel be done in accordance with ICAO standards, as well as English proficiency.	CAA Honduras	MAR/ 2010	Continuous training in the use of aeronautical phraseology provided by ICCAE.
ATM 28 CAR	Use of the aeronautical phraseology	Honduras	In general, the use of aeronautical phraseology in Spanish and/or English does not meet the required levels and it is a relevant factor with regard to ATS incidents.	SEP/ 2000	ATS/SG/9	A	Continuous training in the use of aeronautical phraseology is provided by ICCAE.	CAA Honduras	MAR/ 2010	
ATM 54 CAR	Annex 11, Chapter 3, para. 3.3.3	Honduras TWR and APP of TGU	In the operation of voice recorders equipment of Tegucialpa airport ATC, the following was detected: . Lack of background recording and sound environment of the workstations of air traffic controllers, . Lack of recording register, and . Lack of synchronization of these sysstems with a GPS clock for uniformity of time and voice precise and integral register.	JUN/ 2008	ICAO Visit 06/08	A	1. implement an ATC system on voice recording register and control, 2. implement ATC background recording channels and sound environment 3. synchronize this equipment with a GPS clock to harmonize the register time.			
ATM 55 CAR	Annex 11, Chap. 6, para. 6.4.1	HONDURAS, TWR and APP TGU	Tegucigalpa airport counts with a radar display to provide Approach Control Service. Nevertheless, it does not count with the recording of these data for further reproduction.	JUN/ 2008	ICAO Visit 06/08	A	That DGAC implement a radar recording register and control system.			

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
ATM 62 CAR	Annex 1, Annex 11, Doc 9854, Doc 9750, Doc 9426	Honduras	Establish an ATM Training Plan. There is not a training programme complying with the required aspects concerning staff proficiency in the different ATS specialization areas.	JUN/ 2008	ICAO visit 06/08	A	Develop and implement a training plan for the next 5 years, in line with ICAO guidelines, defining the selection policies and the required training programmes so that ATS personnel efficiently perform the tasks and duties concerning their post, including: p basic training programmes; pfamiliarization or introductory training programmes; refresher training programmes; and professional improvement training programmes.			
ATM 63 CAR	Anexo 11, Doc 4444, Doc 9859	Honduras	Lack of implementation of ATS safety management programmes.	JUN/ 2008	ICAO visit 06/08	A	Implement ATS safety management programme in line with the requirements of Annex 11 including: the publication of regulations on safety management coverng the aspects of information sources protection ; implement ATS quality assurance programmes together with a safety management system (SMS) assessment of incidents and accidents events in order to establish the corresponding safety management programmes; assignment of sufficient and qualified ATS personnel to develop and monitor ATS safety management programmes; implement a ATS safety management programme so that the assigned personnel may perform these duties.			

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
ATM 65 CAR	Doc 7300, Anexo 11, Doc 4444, Doc 9426, Doc 9854	Honduras	Lack of air traffic services (ATS) capacity and of the Honduras international aiports statement.	JUN/ 2008	ICAO visit 06/08	A	Develop a study on demand and cpacity of air traffic services (ATS) of Honduras including: determinae the quantity of required ATC work posts; determinare the quantity of required ATC personnel to properly cover the ATC work posts; determinae the quantity of administrative suppor personnel for ATS; determinae the required specialized personnel for the provision of ATFM service; and determinae the capacity of Honduras airports.			
ATM 66 CAR	Doc 7300	Honduras	Lack of update of ICAO Annexes and required Procedural Manuals in the Honduras ATS units.	JUN/ 2008	ICAO visit 06/08	A	Request ICAO the amendment corresponding to ATS and SAR Annexes and Documents; dprovide the ATS units with the required basic ICAO documentation in line with their duties; and aupdate the operational ATS and SAR procedural manuals in line with the service units.			

OUTSTANDING DEFICIENCIES

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
MEX Mexico										
ATM 51 CAR	Annex 10, Annex 11, Doc 444	SENEAM	Lack of updated Air Traffic Control Procedural Manual and Aeronautical Phraseology Procedural Manual.	DEC/ 2008	SENEAM, in coordination with Mexican DGAC should update ATC operational procedural manual and aeronautical phraseology iin accordance with ICAO SARPs. The Letter of Agreement between Mexico TWR and TMA should be updated and ATS units should be provided with ICAO required basic documentation corresponding to the service.	A				
ATM 52 CAR	Annex 11, Annex 13, Doc 4444, Doc 9859	Mexico	Lack of implementation of ATS safety management programmes.	DEC/ 2008	SENEAM, in coordination with DGAC Mexico, should implement the ATS safety management programmes in line with Annex 11 and Annex 13 requirements, including safety management systems (SMS) programmes; incidents and accidents events risk management programme in order to establish the correspodning ATS safety management programmes; updating manuals concerning incidents and accident investigation; designation of sufficient qualified ATS personnel to develop and monitor ATS safety management programmes; and an ATS safety management training programme so that the designated personnel may perform their duties properly.	A				
ATM 53 CAR	Annex 11, Annex 13, Doc 4444, Doc 9859	Mexico City International Airport, Mexican DGAC	Lack of implementation of ATS safety management programmes.	DEC/ 2008	SENEAM, in coordination with DGAC Mexico, should implement the ATS safety management programmes in line with Annex 11 and Annex 13 requirements, including a safety management programme in Mexico City International Airport.	U				

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	2	3	4	5	6	7	8	9	10	11
NIC Nicaragua										
ATM 1 CAR	Provision of air traffic control service CAR/SAM/3 Rec. 5/33	Nicaragua	Some segments of ATS routes of the FIR do not count yet with ATS at the required levels.	SEP/ 1994	GREPECAS/4, Report IATA Conc. 4/10, Appendix 5	A	The INAC informed of an implementation strategy that could be completed in 2008. The International Airports Administrator company (EAAI) requested the CAA to install secondary surveillance radars at the A. C. Sandino International Aiprort and at the Bluefields aerodrome.	INAC Nicaragua	DEC/ 2008	

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
TTO Trinidad and Tobago										
ATM 56 CAR	Annex 1, Annex 11, Doc 9854, Doc 9750 and Doc 9426	Trinidad and Tobago	Lack of ATS Training Programme	AUG/ 2006	That Trinidad and Tobago develop and implement an ATS training programme taking into consideration the future ATM system and resources required for the next 5 years.	A				
ATM 57 CAR	Annex 11, Doc 4444	Trinidad and Tobago	Lack of implementation of ATS Safety Management programme.	JUL/ 2006	Implement an ATS safety management programme, which includes: a) establishing the amount of ATS personnel qualified to perform regulation tasks and ATS surveillance safety management; b) promoting specialized personnel training in ATS to accomplish these functions; and c) develop an ATS safety programme with preventive measures to avoid runway incursions.	A				
ATM 58 CAR	Annex 11, Doc 9750, Doc 9854	Trinidad and Tobago	Lack of work programme for the implementation of ATM system in the Piarco FIR.	AUG/ 2006	To develop a work programme for the implementation of ATM system in the Piarco FIR, in accordance with the new Global Air Navigation Plan (Doc 9750).	A				
ATM 59 CAR	Annex 11, Doc 4444, Doc 9426	Trinidad and Tobago	Lack of procedure to report, file and follow up failures of ATS communication system.	AUG/ 2006	To develop a procedure to report, file and follow up failures of ATS communication in coordination with the Aerodrome Control Tower and the Approach Control unit, to facilitate investigation, requirements and improvements of ATS communication.	A				

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
ATM 60 CAR	Annex 11, Doc 4444, Doc 9426	Trinidad and Tobago	Lack of information of ATS capacity..	AUG/ 2006	That Trinidad and Tobago carry out a study on demand and capacity of ATS service, to adequately cover the ATC units positions and the future ATFM unit of the FIR Piarco, which includes: a) determining the number of ATC job positions required for the next 5 years; b) determining the number of ATC personnel required to cover adequately the ATC job positions for the next 5 years; c) determining the number of personnel for the administrative support of ATS for the next 5 years; and, d)determining the required specialized personnel for the provision of ATFM service.	A				

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
AIA Anguilla										
CNS 66 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
ATG Antigua and Barbuda										
CNS 65 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		The ECCAA CNS Unit needs to coordinate with TTCAA for the recovery actions of the E/CAR AFS Network operation and restore AFTN services and ATS voice communications. In addition, the ECCAA CNS unit needs to have an active paricipation in the performance revision and follow-up on the E/CAR AFS Network issues. The ECCAA and the Antigua and Barbuda Airport Authority need to develop an interactive procedure to ease the E/CAR AFS failure reporting and follow-up in coordination with the ECCAA CNS Unit.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
ABW Aruba										
CNS 29 CAR	Surveillance Systems (Table CNS 4A)	Aruba/Reina Beatrix APP/Aruba's radar	Communications, Navigation and Surveillance	JUN/ 2000		B	Repair the radar.	Aruba		Comments provided during C/CAR/DCA/10 Meeting: Radar system no longer in use. The ICAO NACC Regional Office sent Aruba letter Ref. EMX0867 dated 15 September 2009, requesting further comments on this deficiency.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
BHS Bahamas										
CNS 49 CAR	Radio Navigation Aids (Table CNS 3) VOR/DME West End	Bahamas/West End	The VOR/DME stations is recommended in the FASID, but it is not implemented.	JAN/ 2004		B	This station is recommended for the West End Intl. Airport, Grand Bahamas Island.	Bahamas		
CNS 58 CAR	CAR/SAM FASID, Doc. 8733, Volume II, Table CNS 3 – Table of Radio Navigation Aids	Bahamas, Nassau International (MYNN)	ILS for runway 14 is out of service	JUL/ 2009	Reported by IFALPA on Annex 19 Information for December 2008	B	Repair/ replace equipment.	Bahamas-Nassau		

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
BRB Barbados										
CNS 67 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
BLZ Belize										
CNS 9 CAR	ATS Speech Circuits Plan (Table CNS 1C) - Belize APP-Puerto Barrios TWR	Belize-Guatemala/COCESNA	The required circuit is not implemented.	NOV/ 1999	COCESNA informed that the Puerto Barrios Airport changed to a National Airport, therefore, this circuit would no longer be an international requirement.	B	Study and implement a possible via. Action Plan: The category of the Puerto Barrios airport was changed to domestic; therefore, this circuit is no longer an international requirement.	Belize, Guatemala and COCESNA		
CNS 57 CAR	ATS speech circuits plan (Table CNS 1C) Belize APP - Merida ACC	Belize and Mexico	The circuit is out of service since 1 June 2003.	JUN/ 2003	Informed during the CA/ANE/WG/3 Meeting and reported by the DCA of Belize.	B	To implement a direct circuit to establish communications in 15 seconds.	Mexico and Belize		

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
CYM Cayman Islands										
CNS 60 CAR	CAR/SAM FASID, Doc. 8733, Volume II, Table CNS 3 – Table of Radio Navigation Aids	Cayman Islands, Owen Roberts International (MWCR)	ILS not implemented for runway 08	JUL/ 2009	Reported by IFALPA on Annex 19 Information for December 2008	B	Implement ILS equipment, revise Air Navigation Plan for implementation of GNSS elements or update of runway type according to operations requirements.	Cayman Islands		

OUTSTANDING DEFICIENCIES

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
COCE COCESNA										
CNS 16 CAR	ATS Speech Circuits Plan (Table CNS 1C) - La Aurora APP - Puerto Barrios TWR	COCESNA-Guatemala	The required circuit is not implemented. An IDD is being used.	NOV/ 1999	COCESNA informed that the airport changed to national category.	B	Find a mean to implement the circuit or a proposal to amend the FASID. Action Plan: The category of the Puerto Barrios airport was changed to domestic; therefore, this circuit is no longer an international requirement.	COCESNA-Guatemala		
CNS 38 CAR	Radio Navigation Aids (Table CNS 3) ILS Intl. Airport, San Salvador, El Salvador, Runway 07	COCESNA-El Salvador	The equipment is obsolete	APR/ 2003	89 Meeting of Civil Aviation General Directors of Central America and Panama (DGAC CAP/89)	B	COCESNA informed that public works have initiated to install new equipment in runway 25. Action Plan: The ILS is in place.	COCESNA-El Salvador	JUL/ 2010	
CNS 39 CAR	Radio Navigation Aids (Table CNS 3) DVOR/DME Puerto San José, Guatemala	COCESNA-Guatemala	The equipment is obsolete	APR/ 2003	89 Meeting of Civil Aviation General Directors of Central America and Panama (DGAC CAP/89)	B	Replacement of a new DVOR/DME Station. This has been included in a COCESNA and State Members project. Action Plan: The replacement of this radio aid has been included in a COCESNA Project.	COCESNA-Guatemala		
CNS 40 CAR	Radio Navigation Aids (Table CNS 3) ILS/DME Intl. Airport La Aurora, Guatemala.	COCESNA-Guatemala	The replacement of the equipment is required	APR/ 2003	89 Meeting of Civil Aviation General Directors of Central America and Panama (DGAC CAP/89)	B	COCESNA informed that the ILS/DME installation is pending. The on-the-site study performed determined that the implementation is not feasible. Action Plan: Within the radio aids replacement project carried out by COCESNA, the corresponding study was carried out and it was concluded that the implementation of this radio aid is not feasible.	COCESNA-Guatemala		
CNS 46 CAR	Radio Navigation Aids (Table CNS 3) ILS/DME Philip S.W. Goldson Airport, Belize, Belize	COCESNA-Belize	The replacement of the equipment is required	APR/ 2003	89 Meeting of Civil Aviation General Directors of Central America and Panama (DGAC CAP/89)	B	A new equipment ILS/DME is required. Action Plan: The replacement of this radio aid has been included in a COCESNA Project.	COCESNA-Belize	JAN/ 2009	

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CNS 48 CAR	Surveillance Systems (Table CNS 4A)	COCESNA	No existence of a surveillance in the remotes zones of the Pacific FIR CENAMER remotes zones.		89 Meeting of Civil Aviation General Directors of Central America and Panama (DGAC CAP/89)	B	Bearing in mind the improvements made by COCESNA in the ACC CENAMER, COCESNA is evaluating the feasibility of implementing ADS based on satellite communications.	COCESNA	DEC/ 2006	No changes have been made.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
MTQGLP French Antilles										
CNS 69 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	Netherlands Antilles/St Maarten	Due to failure of the E/CAR AFS Network, several ATS voice communications are made through Backup circuits.	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore ATS Voice Communications	Netherlands Antilles/St. Maarten		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
GRD Grenada										
CNS 63 CAR	CAR/SAM FASID, Doc. 8733, Volume II, Table CNS 3 – Table of Radio Navigation Aids	Grenada, St. Georges/ Point Salines	ILS not implemented for runway 10	JUL/ 2009	Reported by IFALPA on Annex 19 Information for December 2008	B	Implement ILS equipment, revise Air Navigation Plan for implementation of GNSS elements or update of runway type according to operations requirements.			
CNS 70 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
GTM Guatemala										
CNS 18 CAR	ATS Speech Circuits Plan (Table CNS 1C) - La Mesa APP - Puerto Barrios TWR	Guatemala- Honduras-COCESNA	The required circuit is not implemented. An IDD is being used.	NOV/ 1999	COCESNA informed that the required circuit is not being implemented, due to the fact that there are no facilities, but possible communications links will be analyzed.	B	COCESNA informed that the airport changed to national category. Action Plan: The category of the Puerto Barrios airport was changed to domestic; therefore, this circuit is no longer an international requirement.	Guatemala, Honduras and COCESNA		

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
MEX Mexico										
CNS 54 CAR	VHF/AMS-voice. Aeronautical Mobile Service Plan (Table CNS 2A)	Mexico	Lack of VHF-AMS oral coverage under the FL280 in Houston oceanic FIR in the CTA Merida boundaries with the CTA Monterrey. This requirement does not figure in the Table CNS 2A of the FASID, which ICAO is coordinating with the United States.	JAN/ 2002	RO/ATM mission	A	To implement the required equipment for the operation of VHF/AMS oral functions. Implement a VHF remote stations in Mexico, based in a current agreement between Unites States and Mexico, as well as its mitigation by implementing ADS-B.	Mexico		Budget specific approval for this purpose.
CNS 56 CAR	ATS speech circuits plan (Table CNS 1C) Belize APP - Merida ACC	Belize and Mexico	The circuit is out of service since 1 June 2003.	JUN/ 2003	Informed during the CA/ANE/WG/3 Meeting and reported by the DCA of Belize.	B	To implement a direct circuit to establish communications in 15 seconds. Action Plan: Mexico will send a proposal on this regard.	Mexico and Belize	DEC/ 2009	

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
MSR Montserrat										
CNS 74 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
ANT Netherlands Antilles										
CNS 23 CAR	Radio Navigation Aids (Table CNS 3) - VOR/DME ABA	Netherlands Antilles	DME in bad conditions, and the VOR and DME need to be replaced. VOR/DME ABA is installed in Aruba/Reina Beatrix Intl., but is the responsibility of Netherlands Antilles.	JUN/ 2000		A	VOR DME equipment need to be replaced. Action Plan: Netherlands Antilles has indicated that the VOR/DME ABA is in the process of being replaced.	Netherlands Antilles	DEC/ 2009	Comments provided during C/CAR/DCA/10 Meeting: Two new Doppler VOR/DME systems have been ordered by the CNS provider. One D-VOR/DME will be located at Seru Arikok Aruba to serve as "ABA" VOR/DME en-route aid. This D-VOR/DME system is already delivered. Its installation will start during the coming weeks. The ICAO NACC Regional Office sent Netherlands Antilles letter Ref. EMX0868 dated 15 September 2009, requesting further comments on this deficiency.
CNS 27 CAR	Radio Navigation Aids (Table CNS 3) - ILS Cat. I	Netherlands Antilles/Philipsburg/Princess Juliana, St. Maarten I.	This ILS is not implemented.	FEB/ 1999	The facility was recommended for final approach and landing.	A	Netherlands Antilles plans to implement the ILS or GNSS Cat I system should be updated. Action Plan: GNSS procedures will be applied.	Netherlands Antilles		The ILS required for the St. Maarten airport could not be installed due to construction obstacles. Comments provided during C/CAR/DCA/10 Meeting: ILS will not be commissioned at Juliana Int'l. RNAV instrument approach procedures have been implemented. The ICAO NACC Regional Office sent Netherlands Antilles letter Ref. EMX0868 dated 15 September 2009, requesting further comments on this deficiency.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	2	3	4	5	6	7	8	9	10	11
CNS 51 CAR	ATS Speech Circuits Plan (Table CNS 1C) Curaçao ACC-Baranquilla ACC	Neetherland Antilles and Colombia	Due to a broken down the circuit was discontinued and the impossibility to replace the Curaçao terminal equipment. For this, the IDD is use.	MAR/ 2003	Informed in the C/CAR WG/3 Meeting	B	Implement in a short-term this circuit through a MEVA II and REDDIG interconnection Action Plan: With the MEVA II / REDDIG interconnection the implementation will be imminent.	Netherlands Antilles and Colombia	DEC/ 2009	Comments provided during C/CAR/DCA/10 Meeting: MEVA II and REDDIG interconnectivity is ready for operational use. NAATC Inc. Is now analyzing the proposed agreement received in order to sign. This deficiency will be eliminated shortly. The ICAO NACC Regional Office sent Netherlands Antilles letter Ref. EMX0868 dated 15 September 2009, requesting further comments on this deficiency.
CNS 71 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network (St Maarten)	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
KNA Saint Kitts and Nevis										
CNS 72 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
LCA Saint Lucia										
CNS 62 CAR	CAR/SAM FASID, Doc. 8733, Volume II, Table CNS 3 – Table of Radio Navigation Aids	Saint Lucia, Hewannorra International (TLPL)	ILS not implemented for runway 10		Reported by IFALPA on Annex 19 Information for December 2008	B	Implement ILS equipment, revise Air Navigation Plan for implementation of GNSS elements or update of runway type according to operations requirements.			
CNS 73 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
VCT Saint Vincent and the Grenadines										
CNS 75 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories		Nil

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
TTO Trinidad and Tobago										
CNS 59 CAR	Annex 11, ATS Traffic Services Planning Manual (Doc 9426)	Trinidad & Tobago, PIARCO FIR	Frequency congestion on 123.7 in the late afternoon/early evening.	SEP/ 2010	Reported by IFALPA on Annex 19 Information for December 2008	B	Use of another frequency based on sector workload/ reduce oral communications with datalink services/ improve operational coordinations	Trinidad and Tobago		Trinidad and Tobago has signed a contract for four new VHF frequencies (133.1 - North West Sector, 126.5 - North North Sector, 124.0 - South East Sector - and 119.55 MHz- Terminal/Approach) in addition to a complete replacement with all new equipment for the existing 123.7MHz (North East Sector) and 125.4 MHz (South west sector). The implementation has started and is expected to be completed within the last quarter of 2009. The installation of new equipment for VHF frequencies 123.7, 125.4; new frequencies: 133.1, 126.5, 124.0 and 119.55 at 5 high sites is now expected to be completed within the first quarter of 2010 with testing and commissioning to be completed no later than third quarter of 2010.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
CNS 64 CAR	CAR/SAM FASID, Doc. 8733, Volume II, Table CNS 4A – Surveillance Systems (CAR Portion)	Trinidad & Tobago, PIARCO FIR	Radar out of service	MAR/ 2010	Reported by IFALPA on Annex 19 Information for December 2008	B	Replace Radar System	Trinidad and Tobago		Trinidad and Tobago is in the process of replacing its radar in Trinidad. The commissioning flight inspection is scheduled for 15th October 2009. The Radar remoting from Barbados and Martinique to Trinidad is under way. We are already receiving data from Martinique and the system is currently under test. Radar Data from Barbados should be completed with this third quarter of 2009. Radar data from Barbados should be completed within the first quarter of 2010 with merged image of French radars.
CNS 76 CAR	CAR/SAM ANP Vol. II FASID (Doc 8733) CNS Table 1A AFTN PLAN and CNS Table 1C, ATS DIRECT SPEECH CIRCUITS PLAN	E/CAR States and Territories members of the E/CAR AFS Network	Due to failure of the E/CAR AFS Network, AFTN Service is not being provided adequately and data information transmission is out of service in several States/Territories and several ATS voice communications are made through Backup circuits (VC Bird Intl with John A. Osborne TWR (Montserrat), Bradshaw TWR (St. Kitts) and Pointe-a-Pitre APP (French Antilles))	OCT/ 2009	ICAO Visit to Antigua and E/CAR/WG/31 Meeting	U	Recovery of E/CAR Network operation to restore AFTN Service and ATS Voice Communications	E/CAR States and Territories	OCT/ 2009	Nil

Appendix B

OUTSTANDING DEFICIENCIES

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE SAR FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
GTM Guatemala										
SAR 4 CAR	Annex 12, Doc 9731.	Guatemala	Lack of implementation of Search and Rescue (SAR) service.	SEP/ 2007	ICAO visit 2007	A	Develop an action plan for the implementation of SAR service containing: the development and publication of a SAR regulation including the use, registration and development of ELT on 406 database; establish a national SAR Committee including the coordination between civil and military coordination; designate a SAR point of contact (SPOC) serving as coordinator with the SARSAT system and SAR services of adjacent States; develop a national SAR plan; publish the applicable SAR documentation; establish RSC with the proper equipment; develop a training plan for the personnel involved in coordination, localization and rescue missions; and -implement a qualification/certification procedure for SAR personnel.			

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE SAR FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
HTI Haiti										
SAR 1 CAR	Search and Rescue facilities CAR/SAM/3 Rec. 6/2	Haiti SRR/RCC Port-au-Prince	Search and Rescue	OCT/ 2005	GREPECAS/5., RO ATM/SAR mission in April 2005.	A	A SAR Committee has been put in place in order to prepare the appropriate documentation, make the necessary coordination and implement the SAR Unit. The Procedural Manual and Operation Manual have been adopted. Letters of agreement with different units have been discussed and will be signed soon. A SAR Unit coordinator has been appointed and training is under way to make this unit functional as soon as possible. It is expected that the SAR Unit will be fully operational by the first semester of 2009.	CAA Haiti	JUL/ 2009	

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE SAR FIELD IN THE CAR REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
TTO Trinidad and Tobago										
SAR 2 CAR	Search and Rescue facilities CAR/SAM/3 Rec. 6/2	Trinidad and Tobago RCC Piarco	SAR partially implemented	OCT/ 1995	GREPECAS/5	A	Procurement of equipment ongoing for RCC. SAR services provided by Trinidad and Tobago navy.	CAA Trinidad and Tobago/Ministry of Nat.Sec.	DEC/ 2009	SAR Agreememts with SRRs and RCCs finished.
SAR 3 CAR	Annex 12, Doc 9731	Trinidad and Tobago	No implementation of the RCC for SAR coordination within the Piarco FIR.	AUG/ 2006	Implement SAR requirements in the Piarco FIR, through: a) the elaboration and publication of a SAR legislation, including the use, registration and development of ELT in 406 data base; b) the establishment of a National SAR Committee, including the coordination among civil and military authorities; c) the development of a National SAR Plan; d) the publication of applicable SAR documentation; e) the establishment of RSC with the adequate equipment; f) the development of a training plan for the personnel involved in the coordination, location and rescue missions; and g) the implementation of a grading/certification for SAR personnel.	A				

OUTSTANDING DEFICIENCIES

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
ARG Argentina										
ATM 1 SAM	English proficiency in Air Traffic Services, CAR/SAM/3 Rec. 5/35	Argentina	The proficiency in the English language of some ATC units could be a contributory factor for the occurrence of incidents and/or aeronautical accidents (Annex 1). The level specified in rquirements related to language proficiency in the English language will be a requirement as of 05 March 2011.	OCT/ 1995	GREPECAS/5 Reporting of compliance through Attachment C to communication AN/12.44.6-07/68.	U	0. Performance in the English language of some ATC units could be a contributory factor for the occurrence of incidents and/or aeronautical accidents (Annex 1). For 2009-2010 it is expected to obtain level 4 of ICAO. 1. During the mission of 2006 note was taken on the English proficiency programme in ATS (PRONACEII) implemented. DHA habilitates personnel and establishes the initial and recurrent evaluation system. The Regiones Aéreas evaluate locally and supervise personnel. DTA coordinates periodical evaluation.	CRA Argentina	MAR/ 2011	2008: On 17 May 2007, an agreement was signed between the Ministry of Defence and the University of Buenos Aires, School of Philosophy and Humanities, so as to implement, develop, monitor and evaluate training in the English language (ROGER). This agreement complement regulaton No. 19/05 (PRONACEII). 2007: An action plan with measures to mitigate the risk, as established in ICAO Assembly Resolution A36-11.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
COL Colombia										
ATM 1 SAM	RWY surface conditions (Annex 14, Vol. I, Chap. 3)	Colombia, SAN ANDRES/Sesquicentenario Aerodrome	Rubber contamination on 1st 1000 m of RWY 06. Uneven RWY surface holds numerous large puddles after rain. Poor quality of pavement		IFALPA (EC 2/28 referes)	A	Adopt and implement an airport maintenance programme "PENDING ACTION PLAN"	Colombia		
ATM 286 SAM	Visual Aids (Annex 14, Vol. I, Ch. 5 & Doc 8733, FASID CAR/SAM - AOP)	COLOMBIA/BARRANQUILLA/Ernesto Cortissoz	There is no RWY stripe marking	MAY/ 2003	ICAO Regular Mission (15/16 MAY 2003, Recommended Action AGA/02 of its respective Report)	B	Paint RWY stripe "PENDING ACTION PLAN"	COLOMBIA/ AEROCIVIL		

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	2	3	4	5	6	7	8	9	10	11
ECU Ecuador										
ATM 5 SAM	English proficiency in Air Traffic Services, CAR/SAM/3 Rec. 5/35	Ecuador	The proficiency in the English language of some ATC units is below the desired level and could be a contributory factor for the occurrence of incidents and/or aeronautical accidents. (Annex 1).	OCT/ 1995	GREPECAS/5	U	1. Incorporate personnel with a good level of colloquial English. 2) Establish a training plan and recurrence of the English language. (Mission 2003: State is encouraged to continue with training plan).	CAD Ecuador	DEC/ 2009	2008: Doc DGAC NB-08-08-114 of 15/07/08 Air Traffic Management expresses that the Training plan continues through years 2008 and 2009. 2007: Ecuador informed that its controllers have not been able to reach level 4 of the language proficiency foreseeing its finalization by 2007.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
PRY Paraguay										
ATM 10 SAM	English proficiency in Air Traffic Services, CAR/SAM/3 Rec. 5/35	Paraguay	The proficiency in the English language of some ATC units is below the desired level and could be a contributory factor for the occurrence of incidents and/or aeronautical accidents. (Annex 1)	OCT/ 1995	GREPECAS/5	U	Through Note GNA-001/02 dated 22 November 2002, the administration has initiated the training process for the English language proficiency, scheduled to finalize in 2005. (Mission 2004: State is encouraged to maintain the training programme on this field).	DINAC Paraguay	JAN/ 2010	Paraguay informed that the solution is foreseen by 2007. Since April 2009, this course has been initiated as regards English language proficiency level 5 for ATCOs. It is estimaded to end by January 2010.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
URY Uruguay										
ATM 11 SAM	English proficiency in Air Traffic Services, CAR/SAM/3 Rec. 5/35	Uruguay	The proficiency in the English language of some ATC units is below the desired level and could be a contributory factor for the occurrence of incidents and/or aeronautical accidents. (Annex 1)	OCT/ 1995	GREPECAS/5	U	Through communication No. 025/02 dated 20 March 2002, the Uruguayan administration informed that they are studying the possibility to reinitiate improvement of English courses for ATCOs, planning aeronautical phraseology course for ATCOs with bilingual requirements in Spanish and English. During 2003, training programme was reinitiated to reach level 5 of Annex 1. When hiring neew personnel the minimum level required corresponds to the "First Certificate of Advanced English".	DINACIA Uruguay		Uruguay informed that a training system for air traffic controllers in English language proficiency foreseeing its solution by 2007.
ATM 23 SAM	Use of the aeronautical phraseology	Uruguay	In general, the use of aeronautical phraseology does not meet the required levels and it is a relevant factor with regard to ATS incidents	SEP/ 2000	ATM/SAR 02/00-SAM Meeting.	U	1. Implement a continuous training and updating plan. 2) Continuously monitor its correct use in ATS units. 3) Has training programmes (Mission Nov 2003) for the correct use of aeronautical phraseology in Spanish and English languages for ATCOs, with supervision on the adequate use of the same.	DINACIA Uruguay		Uruguay informed that a training process on the use of aeronautical phraseology for air traffic controllers has been implemented, foreseeing its solution by 2006.

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE ATM FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	**Requirements**	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Priority**	**Description**	**Executing body**	**Date of completion**	**Remarks**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
VEN Venezuela										
ATM 25 SAM	Use of the aeronautical phraseology	Venezuela	In general, the use of aeronautical phraseology does not meet the required levels and is a relevant factor with regard to ATS incidents.	SEP/ 2000	ATM/SAR 02/00-SAM Meeting.	U	1. Implement a continuous training and updating plan. 2) Continuously monitor its correct use in ATS units. (E-CAR/SAM-NE ICG/2 Dic 2003). Realization of refreshment courses for ATCOs during 2004.	INAC Venezuela	JUL/ 2010	2008: A recurring training is kept in aerodrome, approach and control centre phraseology, according to the CATC capacities. 2007: Venezuela informed that a continuing process for training in the use of aeronautical phraseology for air traffic controllers has been implemented, foreseeing its solution by 2007.
ATM 205 SAM	Annex 4, Chap 13, Para 13.6.1 C). Aerodrome/Heliport Chart - ICAO.	Venezuela	Need for the inclusion of geoid undulation in the Aerodrome/Heliport Chart - ICAO.		Records SAM Office.	A	Action Plan (2006) 50% implemented.	Indicated State		

OUTSTANDING DEFICIENCIES

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE SAM REGION

IDENTIFICATION		DEFICIENCY					ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
ARG Argentina										
CNS 11 SAM	Aeronautical Mobile Service Plan. Table CNS 1A. Lack of HF communicaitons coverage in the Ezeiza FIR, Oceanic Sector	Argentina	Deficiencies in the HF communications have been identified in the oceanic part of the Ezeiza FIR.	SEP/ 1994	GREPECAS/4. IATA Report.	U	Total renewal of the HF equipments in Ezeiza (October 1999). The HF transmitter and receiver field antenna repaired on October 1999. FA Atlantic circuit, links verified 86,84%. 1) New position was incorporated for the FA Atlantico. 2) Operational extension of ACC Ezeiza and TMA Baires. 3) Incorporation of means of communications between the aeronautical station and the remote equipment, obtaining the noise suppression in aeronautical station of the ACC. 4) It was Installed a module in the Ezeiza ACC that permit the selection of more than one HF frequency (March 2009). It is foreseen the implementation of the ADS /CPDLC in the ACC of Ezeiza by the end of 2010 5)Admnistrative arrangements for the implementation of an ADS/CPDLC service in Oceanic EZE FIR it is expected on September 2009.	Argentina CAA		Even though the Argentinean Aeronautical Administration has implemented more than one HF frequencies to carry services at Oceanic FIR of Ezeiza ACC, the ATS controller do not use these system.

OUTSTANDING DEFICIENCIES

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
ECU Ecuador										
CNS 29 SAM	Aeronautical Mobile Service Plan. Table CNS 1A. Lack of HF AMS communications in the Guayaquil FIR	Ecuador	Guayaquil AMS HF system out of service	SEP/ 2004	Due to civil works in Guayaquil International Airport the HF station of the mobile aeronautical service is out of service .	A	No information was received on action plan to re install the HF equipments.	Estado		

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
GUY Guyana										
CNS 30 SAM	FASID Table CNS 3	Timehri /Cheddi Jagan Intl Airport	ILS system out of service . This system was installed in 1978. Difficults in its maintenance.	OCT/ 2004	Since the ends of 2003 the ILS system is completely out of service. Lack of spare parts to repair the equipments .This was verified during the CNS mission in Guyana on October 2004.	A	Guyana Civil Aviation Authoruty informed that in the document project “Rehabilitation of the Air Navigation System Infrastructure Department of Civil Aviation of Guyana GCAA” had included in the project the acquisition of an ILS with DME . It is foreseen its implementation by the end of 2010.	State		
CNS 31 SAM	FASID Table CNS 3	Timehri /Cheddi Jagan Intl Airport	DME system out of service . This system was installed in 1978. Difficults in its maintenance. Both DME unities out of service in their RF final power.	OCT/ 2003	Since the ends of 2003 the DME system is completely out of service. Lack of spare parts to repair the equipments .This was verified during the CNS mission in Guyana on October 2004.	A	Guyana Civil Aviation Authoruty informed that in the document project “Rehabilitation of the Air Navigation System Infrastructure Department of Civil Aviation of Guyana GCAA” had included in the project the acquisition of a DME to be associated with the VOR . It is foreseen its implementation by the end of 2010.	State		

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
PER Peru										
CNS 25 SAM	Radio Navigation Service Plan. Table CNS 3. ILS CAT II	Peru LIMA-CALLAO/Jorge Chavez	The current ILS sytem meets CAT I performance	MAY/ 1989	According to the Plan, the ILS requires Category II signal quality	B	Peru has indicated that the airport meets operational conditions for the Category. Only pending is ILS flight inspection.	Peru		

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE SAM REGION

IDENTIFICATION		DEFICIENCY					ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
PRY Paraguay										
CNS 15 SAM	Radio Navigation Service Plan. Table CNS 3. DME	Paraguay ASUNCION/S. Pettirossi	This DME is not implemented	MAY/ 1989	This DME is associated with the ILS for approach and landing operations. NDBs are used as markers	A	PARAGUAY informed that they are not going to install the DME associated to the ILS , because the ILS counts with a medium and external radio marker.	Paraguay		It will be not implemented
CNS 21 SAM	Radio Navigation Service Plan. Table CNS 3. VOR	Paraguay, Mariscal Estigarribia	This VOR is not implemented	MAY/ 1989	This facility, recommended for en-route navigation, would support air routes UA320 and UA321	A	The modernization project of the Paraguayan air navigation system considers the VOR/DME. Date of VOR/DME implementation was not supplied.	Paraguay		

OUTSTANDING DEFICIENCIES

Appendix B

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE CNS FIELD IN THE SAM REGION

IDENTIFICATION			DEFICIENCY				ACTION PLAN			
ID	Requirements	States/facilities	Description	Date first reported	Remarks	Priority	Description	Executing body	Date of completion	Remarks
1	2	3	4	5	6	7	8	9	10	11
SUR Suriname										
CNS 26 SAM	Radio Navigation Service Plan. Table CNS 3. NDB	Suriname PARAMARIBO/Zorg en Hoop	This NDB is not implemented	MAY/ 1989	This facility was recommended for terminal navigation	B	The NDB won´t be installed The Aeronautical Administration of Surinam asked to remove the NDB from Table 3 of FASID.	Suriname		It will be not implemented

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

NAM/CAR Regional Plan for the Implementation of Performance-Based Air Navigation

2.1 The meeting recalled that during the GREPECAS/14 Meeting, taking into account the work projects already initiated in the CAR and SAM Regions, formulated *Conclusion 14/51*, establishing seven performance objectives for the CAR/SAM Regions, with a view to support the transition of systems-based approach to a performance-based approach. These projects contemplate the optimization of the ATS routes structure, improvement to demand and capacity balancing, alignment of the Caribbean (CAR) Region upper airspace classification, implementation of RNP approaches, improvement of data communications among ATS facilities, improvement of situational awareness, and the use of the flexible airspace implementation.

2.2 In view of the above, the NAM/CAR implementation plan was developed in the CAR Region, which was presented to the Third meeting of General Directors of Civil Aviation of North America, Central America, and the Caribbean (NACC/DCA/3). This Meeting adopted Decision NACC/DCA/3/3 - *Approval of the NAM/CAR implementation plan,* which approved the NAM/CAR Implementation Plan developed by the NACC Working Group (NACC/WG); and urged NAM/CAR States, Territories and International Organizations to prepare their national implementation plans based on this plan, in order to have a harmonized inter-regional implementation; and ICAO to take the appropriate measures to monitor the execution of the NAM/CAR Implementation Plan and report NACC/DCA meetings the progress made by the NACC/WG. This plan will serve as a link between air navigation implementation activities of the CAR Region and those defined in the United States NEXTGEN for the short and medium term.

2.3 The meeting also took note that the NAM/CAR implementation plan is based on performance objectives, approved by GREPECAS. Likewise, implementation tasks required for new performance objectives were included as follows:

a) Enhance capacity and efficiency of aerodrome operations;
b) Protection and optimum use of the radio frequency spectrum;
c) Optimization and modernization of the communication infrastructure;
d) Implementation of WGS-84 and e-TOD;
e) Implementation of AIM transition;
f) Improved availability of meteorological information;
g) Improvement of the SAR system; and
h) Implementation of new flight plan model.

2.4 The NAM/CAR Regional Plan for the Implementation of Performance-Based Air Navigation also includes guidelines for the transition to the new flight plan format and action plans for PBN implementation and the implementation of communication, navigation and surveillance systems. The NAM/CAR Regional Performance-based Air Navigation Implementation Plan (NAM/CAR PBANIP) is available on WP/05 of this meeting.

CAR/SAM Transition Plan towards the ATM System

2.5 In order to adequate global planning to the conclusions of the Eleventh Air Navigation Conference, mainly regarding the Global ATM Operational Concept, as well as to the Industry Roadmap, ICAO began the development of the new Global Air Navigation Plan. Apart from the Global ATM Operational Concept, the Global Air Navigation Plan is focused on a group of Global Plan Initiatives (GPI), providing the necessary strategies for implementations aimed to reach benefits for the ATM Community at the short and midterm.

2.6 In view of the above, the CNS/ATM/SG/5 Meeting, upon request of the ATM Committee analysed the Transition Plan towards the ATM Operational Concept for the CAR/SAM Regions, approving chapters 1, 3 and 4 of the mentioned plan. Also it considered that the document should be sent through the GREPECAS ACG through the fast-track mechanism to the AGA/AOP, AIM, HRT and MT Subgroups, to the CNS Committee and to the Institutional Aspects Task Force, so that they may develop the rest of the chapters in the document. It also felt that it should be an evolutionary and dynamic document to reflect the changes generated at a worldwide and regional level. The transition plan was based on the Global Plan Initiatives and on the 7 ATM performance objectives approved by GREPECAS for its use in the CAR/SAM Regions and was addressed to establish an implementation strategy aimed to achieve benefits for the ATM community at the short and mid-term, based on the ATM infrastructure and the available and foreseen aircraft capabilities.

2.7 The ATM/CNS/SG deemed it appropriate that the ATM Committee continue with the revision and updating of the Transition Plan, as well as the submission to the other GREPECAS Contributory Subgroups to make their inputs, understanding that the approval of the final document could be made until the reception of the complementary information.

Drafting of a CAR/SAM Regional ATM Performance-Based Implementation Plan

2.8 GREPECAS/15 Meeting recalled that the ICAO planning objective seeks for the achievement of a global performance-based air traffic management (ATM) system, through the implementation of air navigation systems and procedures in a gradual and effective manner, in terms of cost and collaboration. As a result of the discussion on this matter, GREPECAS formulated Conclusion 15/1, requesting GREPECAS to develop a performance-based regional plan, and requesting States, Territories and International Organizations to develop performance-based national plans.

2.9 The CNS/ATM Subgroup analyzed all the available information, and taking into account the CAR/SAM Transition Plan towards the ATM Operational Concept, the NAM/CAR Regional Performance-Based Air Navigation Implementation Plan, as well as the tasks and activities already initiated in both Regions, created an Ad-hoc Group to elaborate an initial version of a regional plan for the CAR and SAM Regions, to guide in the implementation of air navigation towards the achievement of the ATM operational concept, reflecting performance objectives to be met.

2.10 After a general revision of the work assigned, the Ad-Hoc Group analyzed the reference documentation and concluded that the preparation of an initial version was not feasible in view of the complexity and the limited time of work available, proposing a series of alternatives and strategies to carry out this task.

2.11 During the discussion in the plenary session, in dealing with aspects related with methodology and functional structure of the CNS/ATM Subgroup, the meeting considered that, in view that the NAM/CAR Regions have already approved, by the Civil Aviation Directors, the Performance-based NAM/CAR Regional Air Navigation Implementation Plan, and that the SAM Region had already implemented some of the performance objectives approved by GREPECAS, it was of the opinion that the SAM Region should prepare a performance-based implementation Plan including all air navigation areas, as well as metrics that will serve to measure the performance objective achievement.

2.12 In view of the above, the Meeting agreed on the following:

Decision CNS/ATM/1-1 Regional Performance-based implementation Plan for the South American Region

That SAM States, with the assistance of ICAO, taking as a basis the available documentation in the CAR and SAM Regions:

a) Prepare a performance-based regional implementation plan in compliance with the Global Air Navigation Plan and the Global ATM Operational Concept that includes the regional performance objectives, the performance framework forms (PFF) to be completed by all air navigation areas, such as ATM, CNS, AIM, MET and AGA/AOP, and the corresponding metrics that enable the implementation of performance objectives achievement not later than the end of 2010; and

b) Develop their performance-based national plans harmonized with the SAM Implementation Regional Plan, not later than June 2011.

Performance Monitoring and Measuring

2.13 The Meeting recalled that the ICAO planning objective is to achieve a performance based global air traffic management (ATM) system and that the regional planning and implementation process is the core element of the ICAO planning framework.

2.14 The increased demand for ATS services has focused attention on the performance rather than technology capabilities. As the investment decisions required for providing ATM services become more complex, the need for well defined metrics for ATM systems performance increases.

2.15 The performance monitoring and measurement of ATM systems calls for metrics in area that envelopes access, capacity, cost effectiveness, efficiency, environment, flexibility, predictability and safety.

2.16 Keeping in mind the need to have a common approach, clearly defined as regards performance monitoring and measuring and the need to agree in a standard set of metrics for CAR/SAM Regions, the Meeting adopted the following draft Conclusion:

Draft
Conclusion CNS/ATM/1-2 Adoption of performance monitoring and measurement programme for the CAR/SAM regions

Considering the importance to monitor and measure the achievement of the performance objectives defined for the CAR/SAM Regions, that States, Territories and International Organizations of CAR/SAM Regions:

a) adopt the set of metrics related to key performance areas of access, capacity, cost effectiveness, efficiency, environment, flexibility, predictability and safety; described in **Appendix A** of this part of the report, to monitor and measure the implementation advances of the regional performance objectives;

b) incorporate these metrics into their performance monitoring programmes, collect relevant data and submit to the ICAO Lima and Mexico regional offices on a regular basis;

c) coordinate with ATM community members to promote information and data collection; and

d) inform ICAO Regional Offices of their advances by 30 November 2010.

Progress in the regional implementation of surveillance systems

2.17 The Meeting took note of the project for the restructuring of air navigation services at Cuenca de Campos developed by the Brazilian Administration is aimed mainly at meeting air traffic requirements of helicopters that support the activities on oil platforms in the oceanic area.

2.18 The Meeting was informed that the solution envisaged includes the use of elements foreseen in the CNS/ATM concept, including the use of GNSS for the en-route and approach phases, ADS-B for low-altitude surveillance, and ATM automation in support of terminal approach control. Improvements in other systems, such as COM/AIS/MET, supplement the requirements for the Macaé TMA.

2.19 It was informed that the Macaé TMA will be the first Brazilian airspace to implement an ADS-B-based surveillance system. The operational concept for the aforementioned TMA requires the ADS-B system to have the capability of supporting 5NM separations between aircraft. The system will also provide data to support initial studies for the implementation of ADS-B in continental airspace.

2.20 The Meeting considered that an important characteristic of the project is the requirement for collaborative participation of the various organisations concerned, starting with studies on the development of the operational concept up to decisions on system implementation, therefore, the same could be taken into account in studies that could be carried out by CAR/SAM States. The participating organisations were: the Aviation Authority, the air traffic service (ATS) provider, aircraft operators, the main oil company, and the industry.

2.21 The Meeting was informed that coordination of this project started on the second quarter of 2008, and foresees the use of the ADS-B service for the provision of ATS, including aircraft separation, taking into account exclusionary airspace, by the end of 2012. During this implementation period, services will gradually be implemented to ensure safety.

2.22 The Meeting considered that this Project for Air Navigation Services to the restructuring in Cuenca de Campos will be taken as reference in the development of the task corresponding to the ADSC and ADSB regional implementation plan.

2.23 Brazil informed the Meeting of the implementation of ADS-C/CPDLC in the ACC Atlántico (ACC-AO) and of the training activities required for this implementation for the air traffic controllers and operators of the aeronautical station. Also, it highlighted the lack of information on the avionics existing in the aircraft and the need of working together with the airlines with the aim of increasing the aircraft percentage using the system, with views to implementing new operational improvements, such as 30 NM longitudinal/lateral separation.

2.24 United States provided a presentation on the FAA Surveillance and Dissemination Services Programme, including its global strategy, status of implementation, status of regulation and their efforts in collaborating with the aeronautical community.

Progress in the regional implementation of navigation systems

GBAS implementation in Brazil

2.25 The Meeting took note of the progress made by the GBAS Implementation Project in Brazil. In this respect, it took that, in compliance with the terms of the MoU, DECEA has provided HONEYWELL with GPS data collected from four different sources:

a) Brazilian SBAS Testbed (Novatel Milleniun Receivers) - Sep2001/Jun2004;
b) LAAS TEST PROTOTYPE (Novatel Milleniun Receivers) - Oct2003/Nov2008;
c) Local GPS Data Collection (ASHTECH ZXTREME) - Oct2006/Nov2008; and
d) Brazilian Continuous Monitoring Network (RBMC) - Jun2000/Dec2008 (http://www.ibge.gov.br/home/geociencias/geodesia/rbmc/rbmc_est.shtm).

2.26 With this data, HONEYWELL is comparing the Continental US (CONUS) ionospheric threat model to the Brazilian environment.

2.27 The Meeting was informed that at the end of 2009, DECEA started a bidding process for the purchasing of a GBAS station for the Rio de Janeiro international airport until Deember 2010, with the aim of facing the next solar cycle peak, collecting data and carrying out flight tests with the Flight Inspections Group and voluntary airlines.

2.28 In this respect, the Meeting took note that due to safety reasons, the approval of the product, facilities and services for GBAS in Brazil would only be possible after the next scheduled solar cycle peak has passed.

GBAS implementation in Chile

2.29 The Meeting took note of the actions taken by the DGCA of Chile in order to conduct a ionosphere evaluation for the implementation of a GBAS system for the Arturo Merino Benítez Airport in Santiago.

2.30 In addition, Chile informed that in order to verify the continuous ionosphere comparisons carried out using the Threat Model created for GBAS systems, which was validated by the FAA and presented to the DGCA by the consulting firm ISI, it is necessary to identify an appropriate mechanism to monitor solar activity affecting ionosphere behaviour, especially during solar activity peaks.

2.31 On the basis of the mentioned need and to attain the objectives of GBAS implementation, the DGCA has proposed the FAA to sign a Memorandum of Cooperation to monitor the ionosphere and scintillation trends in order to determine the effects of ionosphere disturbances on the global positioning system (GPS) signal, establishing reference stations in Chile. These stations would collect data on LI and L2 signals, and/or any other relevant data, in order to determine the effects that these disturbances will have on the operational implementation and use of SBAS and GBAS augmentation systems.

2.32 Finally, the Meeting took note of Chile's proposal on the need to identify the necessary mechanisms to obtain international cooperation and thus ensure a new collection of ionosphere data at regional level, during the 2011-2014 period.

Progress and offer of RLA/03/902 – SACCSA regional project

2.33 On the basis of WP/34 (presented by Spain) and WP/40 presented by the Coordinator of Project RLA/03/902, the Meeting noted that one of the important tasks that Phase II of this Project will carry out is to collect plenty information about the ionosphere, part of which will be obtained during solar activity peaks. Therefore, information will be available not only for the definition of a SBAS system, but also for national projects on GBAS, which is also significantly affected by the ionosphere. It will also cover aspects concerning operations and the combination of the various elements of GNSS (GPS, RAIM, ABAS, GBAS and SBAS) to solve any problems arising during all flight phases, as well as the interaction among those same elements.

2.34 Project RLA/03/902 – SACCSA, in its Phase III, goes further than only defining an SBAS, which is its main objective. It could contribute to the needs of the GNSS projects underway in the CAR/SAM Regions, and could also be used to define the use of GNSS systems in locations with complicated ionosphere conditions, which will require abundant data from the coverage area where these systems will be implemented and, given the distribution of monitoring stations to be used for SACCSA, these data could be obtained without incurring in any additional cost. In this regard, the Meeting took note and thanked Project RLA/03/902 for this offer.

2.35 The Meeting took note that currently the following are members of RLA/03/902 project: Argentina, Bolivia, Colombia, Costa Rica, Spain, Guatemala, Panama, Venezuela and COCESNA. In addition, the Eastern Caribbean countries, based on Conclusion 22/9 reached at the recently held 22nd Meeting of Executive Directors of Civil Aviation of the Eastern Caribbean, acknowledged the importance of this Project and are analyzing the possibility of taking action by participating in it. In the same regard, Central American States, on the basis of Conclusion 94/9 adopted by the Directors General of Civil Aviation of Central America and COCESNA during the recently held 94th Meeting of General Directors of Civil Aviation of Central America and Panama in Roatan, Honduras, from 24 to 26 February 2010. In addition, other States have showed interest and expressed their intention to join to the RLA/03/902 project.

2.36 In addition, also on the basis of WP/40, the Meeting took note of the following topics:

a) RLA/03/902 project's reasons for the study of a SBAS solution;
b) Overview of RLA/03/902 - Phase III Project;
c) Restructuring the project management; and
d) International tender offer.

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

2.38 In view of the information and considerations indicated in this part of the Report, the Meeting formulated the following draft Conclusion:

Draft
Conclusion CNS/ATM/1-3 Follow-up, participation and cooperation to ICAO RLA/03/902 regional project

That, with the objective of concluding technical-financial viability studies of the SBAS implementation within the CAR/SAM Regions, under the ICAO RLA/03/902 regional project, the States, international organizations and users are invited to:

a) Participate in Phase III of the RLA/03/902 – SACCSA project and promote cooperation between national entities and make progress on development with support of educational institutions so as to provide scientific and technical support; and

b) Increase coordination and exchange of information on the results obtained and experience gained in RLA/03/902 project, GBAS national projects and other initiatives regarding GNSS implementation.

2.39 The Meeting took note of the main results and recommendations of the Advanced GNSS Seminar/Workshop sponsored by RLA/03/902 project and DGAC Costa Rica, and held in San Jose, Costa Rica, from 20 to 24 April 2009, shown in **Appendix B** to this part of the Report as contribution to the work of the CNS/ATM Subgroup on the regional planning and implementation of GNSS.

Progress in the regional implementation of PBN

2.40 Cuba presented WP/32 with detailed information on the PBN implementation in the Habana FIR. The plan includes the implementation of APV BaroVNAV procedures, as foreseen in ICAO Assembly Resolution A36/23, the publication in the AIP of GNSS regulations, training, etc.

2.41 Brazil presented WP/33 with information on its short (up to 2010) and medium term (2011-2015) PBN implementation plan. The plan includes implementation aspects for en route operations in the continental and oceanic airspace, in the terminal area, the filling of the flight plan, as well as an air navigation procedures implementation programme per aerodrome.

2.42 The Meeting also took note of the PBN implementation plan of Chile and, finally, United States (FAA) presented information on a draft with Mexico (SENEAM), to reduce lateral separation in the Gulf of Mexico (GoM) from 100 nautical miles (NM) to 50 NM and implement a new, more efficient area navigation (RNAV) route structure. The meeting noted that the implementation date for the GoM RNAV Routes Project is expected by the end of 2011.

Miscellaneous information on CNS/ATM implementation in the CAR/SAM Regions

2.43 Cuba informed the Meeting on the implementation of its new ATC simulator, destined to the requalification of the Air Traffic Controllers in Cuba, product of ICAO technical cooperation project CUB/03/901: “Modernization of the Cuban Aviation Training Centre (CAA)” and of its availability in carrying out training with other States, with a mutual collaboration framework.

2.44 The Meeting was informed of the AMHS systems implementation activities in Brazil, Brasilia and Manaus, of its plans for a gradual migration to the AMHS environment of the old AFTN users, of the deactivation of the AFTN centres, as well as of the coordination with CAR/SAM States, Europe, Africa, United States and Spain in the sense of guaranteeing AMHS migration with the States already having available the AMHS application.

2.45 The Meeting received information on the activities carried out by RLA/03/902 project Phase III, published in its Informative Bulletin No. 1.

2.46 United States briefed the Meeting on the Federal Aviation Administration’s Surveillance and Broadcast Services Programme, including its overall strategy, implementation status, rulemaking status and collaborative efforts with the aviation community such as the Gulf of Mexico’s deployment activities on VHF communications, AWOS and ADS-B; proposed Gulf of Mexico’s Route Structure and its East Coast and North Atlantic Tracks activities.

APPENDIX A

PROPOSED LIST OF METRICS FOR PERFORMANCE MONITORING OF AIR NAVIGATION SYSTEMS

Key Performance Area	Corresponding proposed metrics
1. Access and equity	Civil flights using fixed airspace; Unusable airspace due to navigation restriction; Number of access denials; Number of airports with published approaches.
2. Capacity	Average daily airport capacity for a group of 35 airports measured as a 5 year moving average; Hourly number of IFR movements (departure + arrivals) during IMC; Total number of operations per day; Number of aircraft in a specified volume of airspace; Airspace throughput/TMA-number of aircraft per 100 nmi3; Traffic density i.e. number of aircraft per 100 nmi3; Enroute utilization i.e. number of aircraft per 100 nmi3; Airside Capacity i.e. number of operations per hour; Airborne delay i.e. minutes per flight; Arrival/departure delay i.e. minutes per flight.
3. Cost effectiveness	Total operating cost plus cost of capital divided by IFR flights; Average cost per flight at a system wide annual level; Investment cost; Cost per retrofit; Out of service cost; Operating and Maintenance cost.
4. Efficiency	Estimated fuel savings (year 2000 as baseline); Percent of flights departing on-time; Percentage of instrument runway ends with an approach procedure with vertical guidance (APV), (BARO-VNAV and/or augmented GNSS) either as the primary approach or as a back-up for precision approaches; PBN Routes implemented and published in enroute; Number of certified aircrafts and pilots for PBN operations for enroute and TMA; Percent of flights with normal flight duration; Traffic movements i.e. # of movements; Unused capacity i.e. # of movements; Number of ATC automated systems that are interconnected; Number of terminal areas with SID/STAR implemented.

Key Performance Area	Corresponding proposed metrics
5. Environment	Amount of emissions which are attributable to inefficiencies in ATM service provision; Pounds of fuel burn per operation; Local noise foot print; Number of noise complaints.
6. Flexibility	Proportion of rejected changes for which an alternative was offered and taken; Enroute flight distance Percentage of flights off-on ATC preferred routes; Number of backups available for emergency; Flexibility in sequencing; Number of restrictions.
7. Predictability	Variability in delay for arrival time./departure time/enroute and Taxi time i.e. Minutes /flight; Number of aircraft held i.e. # Aircraft /hr; Number of cancellations/diversions/misconnections i.e. #of flights.
8. Safety	Number of runway incursions per year; Number of operational errors per year; Number of accidents per 100,000 departures; Number of fatalities per 100,000 departures; Number of LHD reports.

APPENDIX B

INTERNACIONAL CIVIL AVIATION ORGANIZATION

RLA/03/902 – SACCSA PROJECT

GNSS ADVANCED SEMINAR / WORKSHOP

(San Jose, Costa Rica, April 20th – 24th, 2009)

RESULTS AND RECOMMENDATIONS OBTAINED DURING THE GNSS ADVANCED SEMINAR/ WORKSHOP

As a result of discussion and participants' contribution about the subjects presented in the Seminar/GNSS Advanced Workshop, held in San Jose, Costa Rica, from April 20th-24th, 2009, the following results and recommendations were obtained. These are considered to contribute to achieve an efficient performance for the RLA/03/903 – *Transition to GNSS in the CAR/SAM regions / Augmentation Solution for the Caribbean, Central and South America (SACCSA)*, and therefore, for a global satellite navigation system (GNSS) within these regions:

1. It is recommended that participating countries, international organizations and users follow up experiences related to GNSS implementation and development in a global scope, and GNSS evolution, so that these can be taken into account to optimize the application and achievement of GNSS benefits in the CAR/SAM regions.

2. It is extremely important to complete GNSS implementation in comply with SARPS, guidance materials and ICAO strategy.

3. Taking into account the variety and extent of GNSS applications, co-operation is encouraged between national organizations dedicated to perform research and make progress on development with support of educational institutions (universities and others); so that scientific and technical support is provided. It will also contribute to spread this knowledge and SACCSA could use/pass it to future users, and apply it on multiple areas in the participating countries.

4. It is recommended that the RLA/03/902 Project along with the participating countries contributions evaluate and update the feasibility study regarding the placement navigation loads in future satellites performing similar tasks of the countries within the CAR/SAM region. In addition, it was specified that was necessary to achieve a converging point in the launch projects related to those satellites, with eventual implementation of SBAS navigation volume, cost analysis along with other important matters. In this respect, it was informed that Venezuela has a satellite in service, and also Argentina and Colombia have tentative plans to implement satellites in five years. In addition, it is estimated that other countries within the same region may have similar plans. This should be taken into account in Phase III of the RLA/03/902 Project, along with the study of a viable platform with spatial navigation volume, as it is suggested in one of the work tasks of this project.

5. Participating countries and international organizations should take into account that according to worldwide experience related to implementing SBAS systems, the RLA/03/902 Project is considering the benefit of having three Processing and Control Centres for the eventual SBAS system, which would be located in different places within the CAR/SAM Regions.

6. In Phase III of the SACCSA Project, it is recommended –as part of one of the work tasks- to perform a new analysis on the existing communications infrastructure within these regions in order to determine if it could be used in SACCSA. It will be accomplished by supplying up-to-date information based on co-operation of the participating countries within the CAR/SAM region.

7. It is recommended that SACCSA Project consider that the SBAS system is provided with access to complementary direct communications services (which will add up to the current ones), between the remote stations and the Processing and Control Centres, and among them for coordination and maintenance.

8. It is recommended to countries and international organizations, if they haven't done it yet, to acknowledge that the results obtained during Phase II of the RLA/03/902 Project represent a positive indicator of the technical-financial viability for the SBAS system within the CAR/SAM regions, so that participating countries, international organizations and users—through GREPECAS- can have enough documented evidence to take the correct decision.

9. Administrations are encouraged, if they haven't done it yet, to join and participate on Phase III of the RLA/03/902 – SACCSA Project in order to increase international collaboration and obtain a fulfilling final result. In addition, those administrations and users could see progress and obtain benefits when implementing GNSS and its augmentation systems.

10. It's important to acknowledge that RLA/03/902 Project will bring necessary evidence to optimize possibilities of achieving ICAO's global air navigation plan goal which will be implemented to a solid navigation infrastructure based on performance. It must provide a worldwide, precise and reliable navigation/positioning capacity, with no limits and will contribute to add up benefits regarding operational security, efficiency and continuity of operations.

11. In addition, participants acknowledged that the Project does encourage participating countries, international organizations and users towards the publication and exchange of results and experiences, training, and sharing of resources, infrastructure and available knowledge, so that actors can contribute in the decision making process and obtain benefits.

12. The RLA/03/902 Project is aware of some offers presented to contribute to the development of studies by CeNAT (National Centre for High Technology) and the Engineering Faculty of the Universidad Distrital Francisco José de Caldas-Bogotá, in order to finish studies for the Phase III. This effort is being taken into account and is deeply appreciated. Required coordination will be done to include these contributions to the project work tasks.

13. Participants agreed on the importance of continuing collaboration between the RLA/03/902 Project and GREPECAS. The RLA/03/902 project, which is based on results obtained through studies and evidence, must continue to assist GREPECAS in order to obtain correct conclusions about implementing the operational/regional GNSS model.

14. It's key to take into account that national, regional and global co-operation is crucial for the exchange of knowledge, experiences so that resources can be optimized and goals linked to implementing GNSS can be achieved. This objective can be attained through **integration, coordination and co-operation** of all participating countries and international organizations within these regions along with sectors that require more advanced GNSS services.

15. Participants greeted speakers and congratulated them for the excellent speeches and thanked the SACCSA Project and Costa Rica's DGAC for sponsoring this event.

16. Participants acknowledged that the Seminar/GNSS Advanced Workshop objectives were fully attained and they have contributed to better understanding the RLA/03/902 Project.

17. Numerous participants thanked the invitation to participate in this event and supported the culmination of Phase III of the RLA/03/902 Project. They acknowledged that it will bring multiple benefits to participating countries and international organizations not only in the aeronautical field. In addition, some of them informed that their corresponding administrations are analyzing the possibility of participating in this project.

Agenda Item 3: Review of the terms of reference and working methodology of the CNS/ATM Subgroup

3.1 The Meeting recalled that GREPECAS/15 meeting formulated Decision 15/34, which establishes the new CNS/ATM Subgroup by restructuring the old ATM/CNS Subgroup, with the aim of ensuring a better coordination on ATM and CNS matters and developing a performance-based CAR/SAM planning with views to the implementation of a global ATM system.

3.2 The Meeting took note that GREPECAS/15, upon restructuring the Subgroup, did so with the intent that this GREPECAS contributory body operate in correspondence with the procedures in the GREPECAS handbook, and that it:

a) aligns its work programme with global developments, taking into consideration performance objectives;

b) define specific tasks, their deliverables in set dates and that it carries out an efficient management in their execution; and

c) develop its work programme during its first meeting, taking under consideration the tasks carried out under the CNS/ATM Subgroup, through its ATM and CNS Committees and respective Task Forces.

3.3 The meeting recalled that GREPECAS/15, while adopting performance based approach to regional planning and implementation (Conclusion 15/1 refers), invited States to adopt a national performance framework on the basis of ICAO guidance material and aligned with the regional performance objectives, the regional air navigation plan and the Global ATM Operational Concept. The performance based planning should include identification of performance objectives taking into consideration user expectations and completion of performance framework forms for all air navigation areas. Further to adoption of performance approach by GREPECAS, the meeting reviewed current organizational process, methodologies and work programme of CNS/ATM/SG.

3.4 The Secretariat presented to the Meeting with two proposals for the functional structuring of the CNS/ATM Subgroup, one based on the development of projects, and the other, in task forces for the development of the performance objectives of the Subgroup, approved by GREPECAS.

3.5 The Meeting, upon analyzing the proposals presented, considered that the structure based on the development of project management techniques responded to GREPECAS/15 requirements; therefore, it proceeded with its adoption.

3.6 During the analysis of the Subgroup’s working methodology under the structure based on the development of projects, the Meeting agreed that, in view that the CAR Region already had an approved plan for the implementation of performance based navigation systems, and that the SAM Region, even though it had no plan for the implementation of performance based navigation systems, was currently in the implementation phase of some navigation systems, the CNS/ATM Subgroup should carry out CNS/ATM CAR/SAM planning and monitoring activities in order to facilitate and harmonize the interregional implementation process, to obtain, in the short- and medium-term, clear benefits for the ATM community.

3.7 The structure of the CNS/ATM Subgroup, as well as its working methodology, is shown in **Appendix A** to this Agenda Item. Note can be taken that, within the structure of the CNS/ATM Subgroup, the development of the work programme is through the carrying out of a set of four programmes, identified as:

a) PBN;
b) ATFM;
c) Automation and ATM situational awareness; and
d) Ground-ground and ground-air communications infrastructure

3.8 The ICAO Secretariat, through the ATM and CNS Regional Officers of the NACC and SAM Offices, would be in charge of coordinating the programmes. The carrying out of the programme projects would be in charge of coordinators of project.

3.9 The project coordinators will be members of the Subgroup. The aeronautical administrations of the States members of the Subgroup should provide all support necessary to the personnel in charge of the coordination of tasks of the project.

3.10 The CNS/ATM Subgroup will develop three macro-tasks to comply with its terms of reference. These macro-tasks are identified in items 3 a), 3 b) and 3 c) of the terms of reference of the CNS/ATM Subgroup, shown in **Appendix B** to this Agenda Item.

3.11 Macro-tasks 3 a), 3 b) and some of 3 c) will be developed, fundamentally, by the Secretariat.

3.12 The projects to be initially developed are related with the activities indicated in macro-task 3c). The Meeting, upon analyzing these activities, considered that some of these should not be developed as projects, but as tasks in charge of States or of the ICAO Secretariat. The following activities will not be analyzed as projects:

a) Optimization of the ATS routes structure in the terminal area airspace;
b) Implementation of RNP approaches;
c) Monitoring of RVSM airspace; and
d) Determine environmental benefits as consequence of short and mid-term ATM improvements.

3.13 ICAO, with the aim of making official the nomination of the people elected as project coordinators, as well as of the additional personnel that a State could provide in the development or participation in the activities of the projects, will send a letter by mid-April 2010 requesting the corresponding support. States, Territories and international organizations should present their replies by 14 May 2010. Once the information is received from States, same will be sent by the respective ICAO Regional Offices to the designated project coordinators.

APPENDIX A

WORKING METHODOLOGY AND STRUCTURE OF THE CNS/ATM SUBGROUP, ON THE BASIS OF PROJECTS IMPLEMENTATION

1. OBJECTIVE

1.1 Present a working methodology to define and carry out project plans that satisfy the implementation of tasks assigned by GREPECAS to the CNS/ATM Subgroup and taken under consideration within its terms of reference (TORs).

2. GENERAL CONSIDERATIONS

2.1 The terms of reference of the CNS/ATM Subgroup, as well as the tasks that should be carried out to comply with same are shown in **Appendix B** to this Agenda Item.

2.2 In the CNS/ATM Subgroup TORs, macro-tasks 3 a) and 3 b) represent permanent-type tasks. These tasks should be developed by the CNS/ATM Subgroup Secretariat, with the assistance of the Subgroup. During the meetings of the CNS/ATM Subgroup, the progress made on these macro-tasks would be reviewed. Some of the activities contemplated in macro-task 3 c) will also be carried out by the Secretariat.

2.3 As regards macro-task 3 c) of the CNS/ATM Subgroup TORs, which include the performance objectives indicated in **Attachment A** to this Appendix, as well as possible new performance objectives, detailed tasks should be drafted as well as identify products to deliver with target dates, and monitor the implementation of the following:

a) Performance based navigation;
b) Air traffic flow management;
c) Flexible use of the airspace;
d) Automation;
e) Situational awareness (surveillance);
f) Ground-ground and ground-air communications infrastructure; and
g) Implement the new ICAO flight plan model

3. WORKING METHODOLOGY

3.1 Development of TORs macro-tasks 3 a) and 3 b)

3.1.1 The review of the air navigation plan is a continuous task of the ICAO Secretariat, in coordination with States. The regional planning/implementation mechanisms examine the CAR/SAM Air Navigation Plan (CAR/SAM ANP), in correspondence to dynamic implementation processes. In addition, as consequence of the development of the TORs macro-task 3 c), amendments to the CAR/SAM ANP can originate. All these topics will be documented by the Secretariat and presented to the Subgroup for its consideration and later submission to the consideration of GREPECAS, with the aim of counting with CAR/SAM amendments consolidated in the ANP.

3.1.2 The dealing of deficiencies in the CNS/ATM area would be developed taking under consideration the application of the methodology approved by Council to that effect; this has been complemented with an additional procedure approved by the ASB at GREPECAS/15 meeting. The Secretariat will present at each Subgroup meeting the status in the dealing of deficiencies; the Subgroup, considering the comments of the Secretariat, will examine them and will be able to formulate measures, in the event necessary, to facilitate the solution of the deficiencies. The results of this analysis will be sent to GREPECAS through the ASB.

3.2 **Development of TORs macro-task 3 c)**

3.2.1 The work of the CNS/ATM Subgroup will be developed under a performance based approach, using the performance reference frameworks (PFFs), through the development of project management techniques where identification will be made of the ATM Operational Concept element, the deliverable or intermediate result with the associated Global Plan initiatives/strategies (GPI), the person responsible and the target date. It is important to note that the CAR and SAM Regions have implementation plans on most of these topics. The projects should take under consideration the particular plans of each region and, fundamentally, harmonize them in the inter-regional interphase, with the aim of carrying out a CAR/SAM development planning.

3.2.2 For the carrying out of TORs macro-task 3 c), the Subgroup should count with a structure such as the shown in **Attachment B** to this Appendix.

3.2.3 The tasks detailed in the TORs macro-task 3 c) would be developed through four initial programmes that would compose the main structure of the CNS/ATM Subgroup.

3.2.4 Each programme will have a group of projects assigned to it. The coordination of the programme will be in charge of an ICAO ATM or CNS Regional Officer from the NACC and SAM Offices.

3.2.5 Each project will have a project coordinator and a group of experts responsible for the carrying out of the activities scheduled in same. The people to form part of the project will come from States and Organizations members of the CNS/ATM Subgroup. The financing of the work of the experts in the project will be covered by the States from which they come from. In certain cases to be identified, the ICAO regional projects might provide specific assistance.

3.2.6 The general work would be developed as follows:

a) The coordinators of the programmes for the management in the development of the projects and assistance to the experts from the States in charge of carrying out the projects will be the ATM and CNS Regional Officers from the NACC and SAM Offices;

b) The projects will be carried out by experts that States/Territories/International Organizations name at meetings of the Subgroup, who should count with the total support in resources from their States/Territories/International Organizations, for the development of the activities required;

c) The Subgroup will define the number of programmes necessary, and of the associated projects. The implementation of new necessary projects or the conclusion of an existing project, will be decided upon by the Subgroup;

d) The coordinator of the project, under coordination with the coordinator of the programme, will be responsible for the carrying out of the assigned project. The experts assigned for the carrying out of the activities of a project should follow the guidelines of the coordinator of the project.

e) To harmonize CAR and SAM developments, the carrying out of activities might require the concurrence of experts from both regions, at a given moment.

f) The experts will work through the use of the Internet and will be able to coordinate their work amongst them and the Regional Officers, through electronic means and/or teleconferences.

g) In the event necessary, the coordinators of projects and the coordinator of the corresponding programme will be able to meet in order to coordinate the progress of their activities.

h) The experts will present their work at the dates required by the Subgroup, and indicated in the activities of the project.

i) The Regional Officers in charge of the programmes will be the focal points for any coordination necessary with the projects from the various programmes.

j) The Regional Officer in charge of the programme will document the progress made with regard to the associated projects at each meeting of the Subgroup, and will provide a report in that respect.

k) The Subgroup will examine the work developed by the projects and will inform GREPECAS on their progress and results.

l) Upon completing the scope of the work, the experts will end their assistance in the activities they were charged with.

3.2.7 Attachment B to this Appendix indicates the names of some of the coordinators of projects. ICAO, through the appropriate Regional Offices, will request the respective States, Territories and international organization for the nomination of the experts from the corresponding areas to assume the pending posts, as well as the support personnel necessary for the carrying out of the projects tasks.

4. FUNCTIONAL STRUCTURE OF THE CNS/ATM SUBGROUP

4.1 The functional structure of the Subgroup proposed here, considers a simple organization for the Subgroup. Attachment B to this Appendix presents the functional structure proposed for the Subgroup, which is explained hereunder:

4.2 The functional structure is divided into two levels, one of management and the other, of implementation.

Management level

4.2.1 Within the management level are the resources of the ICAO Secretariat which assists the Chairman and Vice-Chairman of the Subgroup, as well as the carrying out of the tasks related with 3 a), 3 b) y 3 c).

Implementation level

4.2.2 Within this level are the TORs macro-tasks 3a) y 3b). They are fundamentally developed by the ICAO Secretariat. Within the implementation of projects, a definition would have to be made of their implementation priorities, with the aim of obtaining a better efficiency in the works of the Subgroup. The deliverables (results) of these projects are achieved through the development of the activities established in the work programme, which will be implemented by the experts from the CAR/SAM States/Organizations providers and users. The number of experts to work in each project may vary, depending on the specialties and resources necessary to achieve the objectives and obtain the results in the scheduled period.

4.3 The Subgroup will count with a Chairman and Vice-Chairman, who will act in correspondence with the GREPECAS Handbook. The Chairman and Vice-Chairman will be elected by the CNS/ATM Subgroup.

4.4 The Secretariat will be appointed by the Secretary of GREPECAS, and would be composed by the Secretary from one of the areas (CNS or ATM) and a Co-secretary from the area or region opposite to the Secretary, who will be assisted by an ATM and a CNS Regional Officer, in a manner that the Secretariat will be composed by 4 Regional Officers: 2 CNS and 2 ATM.

4.5 The programmes initially considered will be the following:

a) PBN
b) ATFM
c) Automation and ATM situational awareness
d) Ground-ground and air-ground communications infrastructure

4.6 Each programme will have assigned an initial number of projects, based on performance objectives. Attachment B to this Appendix indicates the projects associated to each programme.

4.7 The Secretariat, together with the Chairman and Vice-Chairman, will form part of a Coordination Committee to periodically examine the operation of the Subgroup and the development of its activities. This Committee will work through electronic communications means to carry out coordination. The Chairman, Secretary and Co-Secretary of the Subgroup will be responsible for the operation of this Committee, as per the GREPECAS Procedural Handbook.

5. MEETINGS OF THE SUBGROUP

5.1 The meetings of the Subgroup will be organized and held in accordance with the GREPECAS Procedural Handbook.

5.2 All documentation will generate from the Work Programme of the Subgroup and will be examined in the plenary sessions of the Subgroup. The Chairman of the Subgroup will be able to establish the ad-hoc groups it deems necessary to deepen into the analysis of the documentation presented during the plenary session.

5.3 The ad-hoc groups should not be identified as permanent groups associated to the projects; these groups cease their existence upon the ending of the meeting.

5.4 The Secretariat, in coordination with the Chairman of the Subgroup, will give due follow-up to the actions formulated in each meeting of the Subgroup, and will prepare the documentation to be presented by same, to the meetings of GREPECAS.

ATTACHMENT A

ATM PERFORMANCE OBJECTIVES FOR THE CAR AND SAM REGIONS

<table>
<tr><td colspan="4">OPTIMIZE THE ATS ROUTE STRUCTURE EN-ROUTE AIRSPACE</td></tr>
<tr><td colspan="4">Benefits</td></tr>
<tr><td>Environment
Efficiency</td><td colspan="3">• reductions in fuel consumption;
• ability of aircraft to conduct flight more closely to preferred trajectories;
• increase in airspace capacity;
• facilitate utilization of advanced technologies (e.g., FMS based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency.</td></tr>
<tr><td colspan="4">Strategy</td></tr>
<tr><td>TASK</td><td>DESCRIPTION</td><td>START-END</td><td>STATUS</td></tr>
<tr><td>AOM</td><td>• Develop regional action plan
• Develop Airspace Concept based in CAR /SAM PBN Roadmap, in order to design and implement a trunk route network, connecting major city pairs in the upper airspace and for transit to/from aerodromes, on the basis of PBN and, in particular, RNAV/5, taking into account interregional harmonization
• Develop performance measurement plan
• Formulate safety plan
• Establish collaborative decision making (CDM) process
• Publish national regulations for aircraft and operators approval using PBN manual as guidance material
• Identify training needs and develop corresponding guidelines
• Formulate system performance monitoring plan
• monitor implementation progress in accordance with CAR/SAM PBN implementation roadmap and State implementation plan</td><td>2007-2009</td><td></td></tr>
<tr><td>References</td><td colspan="3">GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures.</td></tr>
</table>

<table>
<tr><td colspan="4">OPTIMIZE THE ATS ROUTE STRUCTURE IN
TERMINAL AIRSPACE</td></tr>
<tr><td colspan="4">Benefits</td></tr>
<tr><td>Environment
Efficiency</td><td colspan="3">• reductions in fuel consumption;
• ability of aircraft to conduct flight more closely to preferred trajectories;
• increase in airspace capacity;
• facilitate utilization of advanced technologies (e.g., FMS based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency.</td></tr>
<tr><td colspan="4">Strategy</td></tr>
<tr><td>TASK</td><td>DESCRIPTION</td><td>START-END</td><td>STATUS</td></tr>
<tr><td>AOM</td><td>• Develop State PBN implementation plan
• Develop Airspace Concept based in CAR /SAM PBN Roadmap, in order to design and implement optimized standard instrument departures (SIDs), standard instrument arrivals (STARs), instrument flight procedures, holding, approach and associated procedures, on the basis of PBN and, in particular RNAV/1 and Basic-RNP12
• Develop performance measurement plan
• Formulate safety plan
• Establish collaborative decision making (CDM) process
• Publish national regulations for aircraft and operators approval using PBN manual as guidance material
• Identify training needs and develop corresponding guidelines
• Formulate system performance monitoring plan
• develop a regional strategy and work programme for implementation; and
• monitor implementation progress in accordance with CAR/SAM PBN implementation roadmap and State implementation plan</td><td></td><td></td></tr>
<tr><td>References</td><td colspan="3">GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures.</td></tr>
</table>

IMPLEMENT RNP APPROACHES			
Benefits			
Efficiency **Safety**	• Improvements in capacity and efficiency at aerodromes. • Improvements in safety at aerodromes.		
Strategy ***(2008-2015)***			
TASK	**DESCRIPTION**	**START-END**	**STATUS**
AOM	• Develop State PBN implementation plan • Develop Airspace Concept based in CAR /SAM PBN Roadmap, in order to design and implement RNP APCH with Baro-VNAV in accordance with assembly resolution A36-23, and RNP AR APCH where beneficial • Develop performance measurement plan • Formulate safety plan • Establish collaborative decision making (CDM) process • Publish national regulations for aircraft and operators approval using PBN manual as guidance material • Identify training needs and develop corresponding guidelines • Implement APV procedures • Formulate system performance monitoring plan • monitor implementation progress in accordance with CAR/SAM PBN implementation roadmap and State implementation plan		
References	GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures.		

<table>
<tr><td colspan="4">ENHANCE CIVIL/MILITARY COORDINATION AND CO-OPERATION</td></tr>
<tr><td colspan="4">Benefits</td></tr>
<tr><td>Efficiency</td><td colspan="3">• increase airspace capacity;</td></tr>
<tr><td>Continuity</td><td colspan="3">• allow a more efficient ATS route structure
• ensure safe and efficient action in the event of unlawful interference;
• make available military restricted airspace more hours of the day so that aircraft can fly on their preferred trajectories; and
• improve search and rescue services.</td></tr>
<tr><td colspan="4">Strategy
(2008-2012)</td></tr>
<tr><td>TASK</td><td>DESCRIPTION</td><td>START-END</td><td>STATUS</td></tr>
<tr><td>AOM</td><td>• develop guidance material on civil/military coordination and co-operation to be used by States/Territories to develop national policies, procedures and rules;
• establish civil/military coordination bodies;
• arrange for permanent liaison and close cooperation between civil ATS units and appropriate air defense units;
• conduct a regional review of special use airspace;
• develop a regional strategy and work programme for implementation of flexible use of airspace in a phased approach beginning with more dynamic sharing of restricted airspace while working towards full integration of civil and military aviation activities by 2012; and
• monitor implementation progress</td><td></td><td></td></tr>
<tr><td>References</td><td colspan="3">GPI/1: flexible use of airspace.</td></tr>
</table>

<table>
<tr><th colspan="4">ALIGN UPPER AIRSPACE CLASSIFICATION</th></tr>
<tr><td colspan="4">Benefits</td></tr>
<tr><td>Efficiency

Continuity</td><td colspan="3">• better utilization of data link communication;
• optimize use of flight plan data processing systems;
• enhance airspace management coordination, message exchange capabilities and utilization of flexible and dynamic airspace management techniques;
• harmonization of interregional coordination processes;
• improvement of airspace interoperability and seamlessness; and
• ensure the provision of positive air traffic control services to all aircraft operations.</td></tr>
<tr><td colspan="4">Strategy
(Target: 2008)</td></tr>
<tr><td>TASK</td><td>DESCRIPTION</td><td>START-END</td><td>STATUS</td></tr>
<tr><td>AOM</td><td>• Develop a regional implementation strategy and work programme for the implementation of ICAO Annex 11 airspace Class A above FL 195.
• identify key stakeholders, ATCOs, pilots, and relevant international organisations for coordination and cooperation on changes for new airspace organization, using a CDM process;
• develop new national airspace organization in accordance with ICAO provisions, as needed;
• Coordinate changes for regional and national documents;
  o Doc 8733, CAR/SAM ANP;
  o AIP; and,
  o ATS letters of agreement
• Carry out improvements in ground systems to support new airspace organization configurations, as necessary;
• Publish national regulatory material for implementation of new rules and procedures to reflect airspace organizational changes;
• Train ATCOs and pilots in new procedures, including all civil and military airspace users, as required;
• monitor implementation progress.</td><td></td><td></td></tr>
<tr><td>References</td><td colspan="3">GPI/4: align upper airspace classification.</td></tr>
</table>

IMPROVE DEMAND AND CAPACITY BALANCING			
Benefits			
Environment	• reduction in weather- and traffic-induced holding, leading to reduced fuel consumption and emissions;		
Efficiency	• improved and smoother traffic flows; • improved predictability; • improved management of excess demand of service in ATC sectors and aerodromes; • improved operational efficiency; • enhanced airport capacity; • enhanced airspace capacity; and		
Safety	• improved safety management.		
Strategy ***Near term (2008)***			
TASK	**DESCRIPTION**	**START-END**	**STATUS**
ATFM (DCB)	• identify key stakeholders (ATC service providers and users, military authorities, airport authorities, aircraft operators and relevant international organisations) for purposes of coordination and cooperation, using a CDM process; • identify and analyse traffic flow problems and develop methods for improving efficiencies on gradual basis, as needed, through enhancements in current: o airspace organization and management (AOM) and airway structure (unidirectional routes), o communication, navigation and surveillance systems, o aerodrome capacity, o ATS capacity, and o ATS letters of agreement; • define common elements of situational awareness between FMUs; o common traffic displays, o common weather displays (Internet), o communications (teleconferences, web), and o daily teleconference/messages methodology advisories; • develop methods to establish demand/capacity forecasting; • develop a regional strategy and work programme for harmonized implementation of ATFM service; and,		

Medium term (2010)			
TASK	**DESCRIPTION**	**START-END**	**STATUS**
	• define a regional strategy to implement the use of a flexible upper airspace (FUA): • evaluate the management processes in the use of the airspace; • improve the current domestic airspace management to adjust dynamic changes to the traffic flows in tactical stages; • introduce improvements to the ground ATS systems and associated procedures for the extension of the FUA with dynamic management processes in the use of the airspace • dynamically implement ATC sectorization with the aim of providing a better balance between demand and capacity that responds in real time to changing situations in the traffic flows and to accommodate in the short-term the users preferred trajectories; • define common electronic information and minimum databases required for decision support and alerting systems for interoperable situational awareness between Centralized ATFM units; • develop regional procedures for efficient and optimum use of aerodrome and runway capacity; • develop a regional ATFM procedural manual to manage demand/capacity balancing; • develop a regional strategy and framework for the implementation of Centralized ATFM unit; • develop operational agreements between Centralized ATFM units for interregional demand/capacity balancing; and, • monitor implementation progress.		
References	GPI/1: flexible use of airspace; GPI/6: air traffic flow management; GPI/7: dynamic and flexible ATS route management; GPI/9: Situational awareness; GPI/13: aerodrome design and management; GPI/14: runway operations; and GPI/16: decision support and alerting systems.		

IMPROVE ATM SITUATIONAL AWARENESS			
Benefits			
Efficiency	• enhanced traffic surveillance; • enhanced collaboration between flight crew and the ATM system; • improved collaborative decision-making through sharing electronic aeronautical data information; • reduction of workload for both pilots and controllers; • improved operational efficiency; • enhanced airspace capacity; • improved implementation on a cost-effective basis;		
Safety	• improved available electronic terrain and obstacle data in the cockpit; • reduction of the number of controlled flight into terrain related accidents; and • improved safety management.		
Strategy ***Near term (2010)***			
TASK	**DESCRIPTION**	**START-END**	**STATUS**

ATS (ATM SDM)	• identify parties concerned
	• identify the automation level required according to the ATM service provided in airspace and international aerodromes, assessing
	  o operational architecture design,
	  o characteristics and attributes for interoperability,
	  o data bases and software, and
	  o technical requirements;
	• improve ATS interfacility communication
	• implement flight plan data processing system and electronic transmission tools
	• implement radar data sharing programs where benefits can be obtained
	• develop situational awareness training programmes for pilots and controllers
	• implement ATM surveillance systems for situational traffic information and associated procedures
	• implement ATS automated message exchanges, as required
	  o FPL, CPL, CNL, DLA, etc.
	• implement automated radar handovers, where able;
	• implement ground and air electronic warnings, as needed
	  o Conflict prediction
	  o Terrain proximity
	  o MSAW
	  o DAIW
	  o Surveillance system for surface movement
	• implement data link surveillance technologies and applications: ADS, CPDLC, AIDC, as required		

Medium term (2015)			
TASK	**DESCRIPTION**	**START-END**	**STATUS**
	• implement additional/advanced automation support tools to increase aeronautical information sharing • ETMS or similar • MET information • AIS/NOTAM dissemination • Surveillance tools to identify airspace sector boundaries • Use of A-SMGC in specific aerodromes, as required • implement teleconferences with ATM stakeholders • monitor implementation progress		
References	GPI/1: flexible use of airspace; GPI/6: air traffic flow management; and GPI/7: dynamic and flexible ATS route management; GPI/9: Situational awareness; GPI/13: aerodrome design and management; GPI/14: runway operations; and GPI/16: decision support and alerting systems; GPI/17: implementation of data link applications; GPI/18: aeronautical Information; GPI/19: meteorological systems.		

ATTACHMENT B

STRUCTURE OF THE CNS/ATM/SG

CNS/ATM SUBGROUP

Secretary/Co-Secretary (ICAO

Chairmanship / Vicechairmanship (CNS/ATM/SG member)

PBN PROGRAMME
Víctor Hernández

PROJECT A1:
Optimization of the ATS routes network structure in the en-route airspace

PC: Julio Pereira (Brazil)

PROJECT A2:
Air navigation systems in support of PBN

PC:TBD

ATFM PROGRAMME
Jorge Fernández

PROJECT B1:
Improve the balance between demand and capacity:

PC: Joe Hof (United States)

PROJECT B2:
Flexible use of the airspace

PC: Joe Hof (United States)

AUTOMATION AND ATM SITUATIONAL AWARENESS PROGRAMME
Julio Siu

PROJECT C1:
Automation (systems interconnection)
PC : André Jansen (Brazil)

PROJECT C2:
Improve ATM situational awareness

PC: Veronica Ramdath (Trinidad & Tobago)

PROJECT C3:
Implement the new ICAO flight plan format

PC: Jorge Avila (Brazil)

GROUND-GROUND AND GROUND-AIR COMMUNICATIONS INFRASTRUCTURE PROGRAMME
Onofrio Smarrelli

PROJECT D1:
CAR/SAM ATN architecture

PC: Athayde Frauche (Brazil)

PROJECT D2:
ATN ground-ground and ground-air applications

PC: Dulce Roses (United States)

PC: Project Coordinator

APPENDIX B

TERMS OF REFERENCE OF THE CNS/ATM SUBGROUP

Terms of Reference (TOR)

1. To plan a performance based transition to the ATM system envisaged in the Global ATM Operational Concept, considering the regional performance objectives, supported by the Global Air Navigation Plan Initiatives (GPIs);

2. Carry out CNS/ATM CAR/SAM planning activities to facilitate and harmonize the inter-regional implementation process to obtain in the near and medium terms, clear benefits for the ATM community; and

3. In meeting these TOR, the Subgroup should perform the following tasks:

   a) monitor the CNS/ATM aspects of the CAR/SAM Air Navigation Plan and propose corresponding amendments to keep it up-to-date;

   b) identify and report CNS/ATM air navigation deficiencies based on the Council approved methodology and GREPECAS complemented procedures; and

   c) considering the existing performance objectives (new objectives to be developed as necessary), develop detailed tasks, identify deliverables with deadlines and monitor implementation of the following:

- Performance based navigation
- Air Traffic Flow Management
- Civil/Military coordination
- Automation
- Situational awareness (surveillance)
- RVSM
- Communication infrastructure for ground to ground and ground to air
- Transition to the new ICAO Model Flight Plan
- Determine environmental benefits as consequence of short- and medium-term ATM improvements

Composition: Argentina, Antigua, Barbados, Bolivia, Brazil, Chile, Colombia, Cuba, Dominican Republic, Ecuador, Francia, Guatemala, Haití, Jamaica, Mexico, Panama, Paraguay, Perú, Spain, Trinidad & Tobago, United States, Uruguay, Venezuela, ARINC, COCESNA, IATA, IFALPA, IFATCA and SITA.

Agenda Item 4: Review to pending matters of the ATM/CNS/SG, ATM/COMM, CNS/COMM and respective Task Forces, for consideration in the CNS/ATM Subgroup work programme

ATM matters

ATM operational implementation scenarios

4.1 The Meeting examined the ATM operational implementation scenarios, taking into account the regional performance objectives (RPOs) adopted by GREPECAS to reorganize the CNS/ATM/SG work programme. The analysis included other strategic operational improvements (SOI) to facilitate the CAR/SAM States/Territories/International Organizations the development and harmonization of their air navigation systems implementation plans.

4.2 Note was taken that, as a follow-up to GREPECAS Conclusion 15/1, ICAO organized workshops on performance-based planning, supported by two Special Implementation Projects (SIPs) for the CAR/SAM Regions. The first workshop was held in Lima, Peru, from 13 to 17 April 2009, and the second workshop was held in Mexico City, Mexico, from 6 to 10 July 2009. Also, ICAO has provided assistance to States/Territories and International Organizations for the implementation of the PBN.

4.3 Regional implementation initiatives were integrated into the ATM/CNS/SG work programme through the following 7 regional ATM performance objectives approved by GREPECAS:

a) En-route airspace ATS route structure optimization;
b) Terminal airspace ATS route structure optimization;
c) RNP approaches implementation;
d) Improvements to civil-military coordination and co-operation;
e) Alignment of upper airspace classification;
f) Improvement of demand-capacity balance (ATFM); and
g) Improve ATM situational awareness.

PBN implementation

4.4 Note was taken that PBN implementation is related with Regional Performance Objectives (RPO) regarding optimization of the en-route ATS route structure, optimization of the ATS route structure in the terminal area and implementation of PBN approach, and that many of the tasks described in RNP strategies are currently developed by States/Territories/International Organizations. ICAO has kept continuous coordination and monitoring on the latest implementations of RNAV routes and RNAV/RNP approach procedures.

4.5 Nevertheless, in the medium-term, the development of an integral PBN airspace concept foreseeing new ATS capabilities to cover the future air traffic growth demand is required. This task will need the analysis of the new upper and lower airspace and airport adjacent areas requirements, through the coordination of a multi-disciplinary group on factors such as airspace organization and management, assessment of the existing fleet capacity and of the available CNS infrastructure, publication of routes and procedures, performance metrics, etc.

Optimization of the ATS routes structure in the en-route airspace

4.6 As of 2000, when the ATS routes implementation process started, the implementation of many RNAV routes in the CAR/SAM upper airspace was achieved, as per GREPECAS recommendations, plus many other new ones which had not been foreseen. These implementations have been carried out by identifying the particular needs of the users, operators and ATS services providers. The Meeting noted that the implementation programme has generated important operational and economical benefits.

4.7 Upon evaluating the operational results of the most direct flight trajectories, as well as the savings in flight distances and time obtained through the implementation of RNAV routes, it can be concluded that the aircraft operators requirements to obtain operational and economical advantages has been satisfied in great measure. Nevertheless the benefits obtained, the possibility of implementing new RNAV routes has been identified.

4.8 In addition, the traffic increase foreseen for the next years, the great demand of direct trajectories outside the route and the possible implementation of additional routes could lead to a saturation in the various airspaces, which would complicate the airspace management.

4.9 Therefore, the Meeting considered it is convenient to carry an overall review to the upper airspace, for the possible implementation of new RNAV routes and the elimination of those conventional routes of low use, whose trajectory coincides or is similar to the fixed RNAV or random routes.

Optimization of the ATS routes structure in the terminal airspace

4.10 It was recalled that GREPECAS recommended the implementation of trunk routes that might link the upper airspace RNAV routes with the arrival and exit routes implemented in the terminal areas. With this approach in mind, SIDs and STARs have been implemented and improved in the terminal areas and international airports of many CAR/SAM States. Nevertheless, considering the current aircraft navigation capacity, it becomes necessary to evaluate other alternatives that permit linking the upper airspace routes structure with the terminal area routes; one of these alternatives is the implementation of continuous descent operations (CDO).

4.11 CDO can include the arrival route of an optimum trajectory calculated by the aircraft flight management computer (FMC) from the initial time of descent (TOD), or another operationally defined point, up to a point where the approach procedure to the airport is started.

4.12 The CDO concept will permit adjusting an aircraft's arrival trajectories and designate the speed necessary to maintain the separation and the order that the air traffic control (ATC) provides and will provide a substantial improvement in operational forecasting. The CDO also maximizes the advantages for each flight in terms of less fuel consumption, less gas emissions and less noise, as well as better forecasting possibilities for the flight crew and the aircraft user.

4.13 The implementation of CDOs will entail a review to the organization of the lower airspace and improving air traffic management, where operational advantages can be obtained. The implementation tasks and advantages of CDO also have impact on other air navigation areas, such as the need of improving ATM automation, airspace and airport demand and capacity, meteorological information provision and publication of information in the AIP, etc.

Implementation of RNP approaches

4.14 The Meeting took note that, in conformity with ICAO Assembly Resolution A36-23, CAR/SAM States have completed a PBN implementation plan that includes implementation during 2010 of vertical guide approach procedures (APV) (BARO-VNAV and/or augmented GNSS), be it as primary approach or as support for precision approaches. Note was also taken that currently, PBN procedures have been implemented in many CAR/SAM airports. Nevertheless, the general implementation results will be able to be obtained towards the end of 2010.

4.15 With this vision, the Meeting considered it necessary to develop an airspace concept according to the PBN Manual, Doc 9613, which could be adopted gradually in the short- and medium-terms by CAR and SAM States, Territories and International Organizations, with the aim of determining and justifying the future implementations to improve the airspace organization and management (AOM).

4.16 The Meeting recognized that, with the use of GNSS, there is a single navigation reference to operate globally with an accuracy of a few meters. This reference, aided by satellite based augmentations and with GPS augmented by GBAS, will provide accuracy and availability capable of supporting approach down to Cat I. Therefore, it is required to analyze current navigation infrastructure and all future navigation applications for the use of an on-board RNAV system.

4.17 The Secretariat informed that the ICAO Council had approved a Special Implementation Project (SIP) to organize a Meeting/Workshop on PBN Airspace Concept, to take place in Mexico City, from 5 to 7 July 2010.

Improvements to Civil/Military Coordination and Co-operation

4.18 The need of a greater airspace and operations monitoring capacity requires improvements to the coordination among civil and military authorities. In the medium-term, this coordination will facilitate the implementation of the flexible use of airspace (FUA) and will also have an impact on an improvement to search and rescue (SAR) services that are presently provided by mixed civil and military agencies.

Alignment of the upper airspace classification

4.19 The Meeting took note that harmonizing upper airspace classifications helps the implementation of PBN. In line with PBN objectives, airspace should be structured as a continuous space, free of discontinuities and operational differences wherein divergent rules and procedures are not applied.

4.20 This task will also facilitate the introduction and better use of data link communications, better flight plans processing systems, as well as airspace management coordination instruments and advanced message exchange capacities, and therefore a more flexible and dynamic airspace management is obtained. The upper airspace should be published as A Classification when it is over FL195 in a uniform manner in the CAR/SAM Regions.

Improve Demand and Capacity Balance (ATFM)

4.21 According to the continuous traffic growth foreseen or the medium-term, the implementation of improvements to the demand and capacity balance of air navigation services is required. The possible implementation areas should be coordinated in a regional manner in order to avoid differences between the applicable procedures. Other regional ATFM implementation activities are extended beyond 2014.

4.22 Among these activities, is the review to the ATS contingency plans (due to hurricanes, volcanic ash emissions, etc.), under analysis and declaration of ATS capacity, review to the methodologies to calculate the type of occupancy in runways, the design and evaluation of the airspace and PBN implementation, etc.

Enhance Safety and Efficiency of Aerodrome Operations

4.23 The Meeting noted that the aerodrome design and management activities, including coordination and collaboration between ATM providers, vehicle operators and aircraft operators have an impact on safety and capacity at aerodromes. The need to analyze new requirements are seen for many international aerodromes in terms of ground infrastructure including, inter alia, more high speed taxiways, additional parking gates, and aerodrome management to reduce runway occupancy time, improve operations movement and facilitate all weather air operations, etc.

4.24 With these considerations, the Rapporteur of the ATFM Task Force (ATFM/TF) presented WP/11 with a proposal of an ATFM Manual for the CAR/SAM Regions, which is included in **Appendix A** to this part of the Report. The Meeting approved this manual and noted that same had been coordinated with ICAO Headquarters for its possible worldwide application, formulating the following draft Conclusion:

Draft
Conclusion CNS/ATM/1-4 Adoption of the CAR/SAM ATFM Manual

> That, considering the importance to harmonize the implementation of ATFM in the CAR/SAM Regions, States, Territories and International Organizations of the CAR/AM Regions adopt the ATFM Manual shown in Appendix A to this part of the Report.

Report of the Scrutiny Working Group (GTE)

4.25 CARSAMMA, together with the Scrutiny Working Group, analyses the LHD events reported in the CAR/SAM Regions. A total of 422 LHD reported in the CAR and SAM Regions were submitted for analysis by the Meeting. The methodology approved by the GTE and the values of required parameters to carry out a risk assessment in the referred airspace is used for the analysis. The summary of the analysis made to the LHD events are shown in **Appendix B** to this part of the report.

4.26 This task reviews, among other data, the estimated flight time in incorrect levels, the large-height deviations (LHD) in each one of the reports, levels of flights crossed in these deviations, and the causes in each one of them. These values were used by CARSAMMA to estimate the operational risk of operations carried outs in the CAR and SAM RVSM airspace.

4.27 The evaluation indicates that the collision risk for any of the regions is higher than the reference TLS of 5.0×10^{-9} fatal accidents per aircraft flight hour. The operational risk for the CAR region is higher than the reference value, approximately 16 times the TLS. For SAM region it was approximately 7 times the TLS. CAR/SAM system presents an operational risk of approximately 10 times the TLS. The safety is being compromised because the occurrence of operational errors of all types classified by ICAO continues, and continues to be affected principally by common procedure errors of ATC-unit to ATC-unit transition message (code M) and negative transfer received from transitioning ATC-unit (code N).

4.28 From the analysis of LHDs, several matters of interest arose:

a) It was again recalled that GREPECAS/15 Conclusion 15/36 encouraging States, among other matters, to implement the error prevention programme in the communication cycle between adjacent ACCs;

b) *Actions to be adopted by States to reduce coordination errors between adjacent ACCs"* were approved, requesting that CAR/SAM States and International Organizations, in addition to the error prevention programme in the communication cycle between adjacent ACCs, take into account the following matters:
   - To develop training programmes for ATCOs, and to include the importance of air traffic coordination between ATC units in basic courses curricula;
   - To analyze a better reorganization of the ATS routes;
   - To train the ATS units supervisors and ANS inspectors on the management of operational errors, as per ICAO Circular 314;
   - To carry out a revision of letters of agreement between ACCs, so as to consider the inclusion of procedures and mechanisms to exchange information on coordination incidents among ATC units; and
   - To include within the development plans, the implementation of technology that permits automatic coordination among ATS units.

4.29 Within the measures that could reduce LHD events, the Meeting recalled that at an analysis had been made within the GTE environment of a procedure for pilots to communicate 5 minutes before reaching the accepting ACC transference point, and for implementation purposes, the Meeting considered that the ACCs should instruct pilots so that they communicate 5 minutes before the transference point. It also requested ICAO Secretariat to send a letter to IATA, so that the latter communicates the associate parties and take actions to also instruct pilots on this procedure.

4.30 States were requested to send LHD information as established by GREPECAS Conclusion15/36, which establishes that these events must be sent to CARSAMMA before the tenth day of each month.

4.31 Another aspect that CARSAMMA submitted for consideration of the meeting is the amount of aircraft flying in RVSM airspace, and is not in the CARSAMMA database, or any other Monitoring Agencies. The Secretariat informed that a letter had been sent to CAR/SAM States requesting information on aircraft that are not in the data base, as approved, but no reply has been received so far. The Meeting requested the Secretariat to insist with States in order to receive such information.

Implementation of the ICARD database in the CAR/NAM and SAM Regions

4.32 *"Where a significant point is required at a position not marked by the site of a radio navigation aid, the significant point shall be designated by a **UNIQUE** five-letter pronounceable "name-code"*.From the above definition of a five-letter name–code (5LNC) given in Annex 11 Appendix 2, paragraph 3.1, the Meeting recalled that, in a cooperative effort, a system has been developed by Eurocontrol named the ICAO Regional Database (ICARD) system (http://www.eurocontrol.int/icard/ public/ subsite_homepage /homepage.html), which includes, the Five-Letter Name-Codes and Route Designators applications. The ICARD 5LNC application is intended to facilitate the management of Five Letter Name Codes (5LNC).

4.33 The Meeting was presented with an update of the activities conducted in the CAR/NAM and SAM Regions relative to the implementation of the ICAO regional database for five- letter name-codes (5LNC) and route designators (ICARD).

4.34 The Meeting was informed that ICAO and EUROCONTROL in collaboration agreed to the ICARD design and the commitment by EUROCONTROL to provide support for the global operation of ICARD. Also, the Meeting noted that the application developed for route designators currently does not allow an immediate global use and that the ICAO State Aviation Safety Tools unit (SAST) had been tasked to establish a global Route Designators database in the second half of 2010. This activity will be coordinated with the Regional offices accordingly. Furthermore, the ICAO Air Navigation Bureau will prepare a proposal for amendment to Annex 11, Appendix 1 to add additional letters as new ATS route designators, for an applicability date in November 2012.

4.35 In order to complete a successful implementation of the 5LNC database system, the meeting agreed to coordinate with their respective SAM and NACC Offices to ensure that the 5LNCs published in their national publications concur with 5LNCs listed in ICARD. To that end, a list of the ICARD nominated authorized users was provided to the Group for update and future coordination. Also, the Group was provided with a presentation offering a detailed guidance to ICARD authorized users.

4.36 Finally, the Meeting was advised that the global 5LNC implementation was expected for 2010 and would imply a greater coordination between States and the ICAO regional offices in view of the update the 5LNC lists as well as the necessity to clear the duplicates. This future global database will then become a unique database, offering a greater choice of 5LNCs and the possibilities to safely create new 5LNCs.

CNS matters

Report of the fourth meeting of the GNSS Task Force (GNSS/TF/4)

4.37 The Meeting was informed of the results of the GNSS/TF/4 meeting held in Mexico City from 8 to 9 September 2009. This meeting analyzed the following subjects:

a) Develop draft regional guidelines for the evolution of air navigation systems in support of PBN implementation;
b) Propose technical training programmes on GNSS systems for CAR/SAM States;
c) Provide CAR/SAM States with guidance on the practical methodology for the implementation of GBAS systems; and
d) GNSS work programme for the new CNS/ATM Subgroup.

4.38 Within the development of proposals on regional guidelines for the evolution of air navigation systems in support to PBN implementation, the Meeting:

a) Approved the *CAR/SAM strategy for the evolution of air navigation systems* proposal in support of the implementation of performance based navigation (PBN), taking into consideration that same is based upon the PBN roadmap. This strategy is included in **Appendix C** to this part of the Report; and

b) Took under consideration the importance of collecting data on avionics, not only for navigation-related works, but also for other works of the Subgroup, and analyzed the avionic survey model proposed by IATA, considering that same would be enough if it specified in what region (CAR/SAM) the aircraft operates, and identified the need that States request similar information from general aviation users and domestic fleets non-IATA members, to be able to complete the user information, in a similar manner as that carried out in the SAM Region. The data base with the information collected to date in the SAM Region on the avionics equipment to support PBN is available for its inclusion in the CAR/SAM avionics data base. This complementary information should form part of the data base that IATA is organizing, in order to count with only one source of information in this respect.

c) In addition, the Meeting took note of the importance in obtaining information from the industry on the development of the capabilities that are being programmed in avionics regarding GNSS navigation, and that ICAO could contribute in obtaining this information.

4.39 In this sense, the Meeting formulated the following draft conclusion:

Draft
Conclusion CNS/ATM/1-5 Collection of information on existing and future avionics in the CAR/SAM Regions

Taking into account the importance of having information on avionics already installed and to be installed on user aircraft, for purposes of planning and cost/benefit analyses, it is urged that:

a) States/Territories and International Organisations are urged to collect information on avionics already installed and to be installed in non-IATA domestic fleets and other general aviation users, suggesting the adoption of a format similar to that of the IATA survey form (**Appendix D** to this part of the Report), the results to be sent to the respective ICAO Regional Office by **December 2010**;

b) IATA include the aforementioned information in the IATA database, informing the ICAO CAR/SAM Regional Offices about the response to this request; and

c) The information collected to date in the SAM and CAR Regions be included in the mentioned data base, as well as any information that can be provided by the avionics manufacturers.

4.40 The Meeting took note of the draft *Guidelines for the preparation of a GNSS training programme* for the CAR/SAM States, presented as Appendix A to the Report on Agenda Item 2 of GNSS/TF/4 meeting. In this respect, comments were made on the importance of the learning provided by some ICAO technical cooperation projects, and of the convenience of considering these training contributions for other types of users, such as procedure design, for which this information was analyzed under Agenda Item 6.

4.41 Taking into account the estimate dates for the continuing of studies and validations in the implementation of a GBAS system by Brazil and Chile, it was agreed to postpone the date for the drafting of a guidance document on a practical methodology for the implementation of GBAS systems to a later date, after the ending of the next solar cycle.

Report of the fifth meeting of the ATN Task Force (ATN/TF/5)

4.42 The Meeting was informed on the results of the ATN/TF/5 meeting, held in Mexico from 12 to 13 June 2009. The ATN/TF/5 analysed the following issues:

a) Review of ATN planning/implementation activities in the CAR/SAM Regions (ATN routers trunk network, ATN routers regional plan, ATN ground to ground applications plan, IP regional routing plan, IP routers policy, IP routers ICD, IP trials procedures and IP communications results);
b) Review of activities carried out in other ICAO Regions;
c) Review of ICAO Docs. 9880/9896;
d) Review of AMHS implementation Regional Plan in the CAR/SAM Regions and AMC services directory;
e) Review and update of ATN Initial Transition Plan in the CAR/SAM Regions; and
f) Task force work programme.

4.43 The Meeting took note that the ATN/TF/5 while reviewing the ATN planning/implementation activities in the CAR/SAM Regions established an IP routing scheme to be implemented in the CAR/SAM Regions for inter and intra regional communications links that will support ATN ground to ground applications. In **Appendix E** of this agenda item the routing scheme for the SAM Region is being presented. For the CAR/NAM Regions a similar proposal is under elaboration. In this regard, the Meeting considered the following draft conclusion:

Draft
Conclusion CNS/ATM/1-6 Proposed routing scheme for IPv4 for inter and intra regional communications links for ATN ground to ground applications

That, the CAR/SAM Regions use the IPv4 routing scheme for inter and intra regional communications links in ATN ground to ground applications for described in Appendix E to this part of the Report**.**

Report of the third meeting of the Surveillance Task Force (SUR/TF/3)

4.44 Similarly, the GREPECAS SUR/TF/3 meeting presented the results of its meeting, held in Mexico City, from 10 to 11 September 2009. The SUR/TF/3 reviewed the following issues:

a) Review and provide follow up to the report of the second meeting of the Surveillance Task Force, and conclusions and decisions adopted during the Surveillance Task Force meetings;
b) Review and consolidate the progress of ADS-B and multilateration trials and other improvements implemented in CAR/SAM Regions surveillance systems;
c) Review progress attained by the Aeronautical Surveillance Experts Group (ASP);
d) Develop a regional strategy for the implementation of the CAR/SAM Regions surveillance systems;
e) Elaborate a plan for the implementation of short- and medium-term surveillance applications in the CAR/SAM Regions;
f) Review the terms of reference and future work programme; and
g) Other issues

4.45 Among the subjects dealt with, the ADS-B trial results are to be highlighted, to which the Meeting agreed in formulating the following draft conclusion:

Draft
Conclusion CNS/ATM/1-7 Improvements to the activities referred in ADS-B trials

That, States/Territories/International Organizations who are carrying out ADS-B trials are urged to:

a) Continue with the data collection and analysis, in accordance with GREPECAS guidelines (GREPECAS/15 report, Appendix Q);

b) Search for the Exchange of data between States, particularly with regard to coverage superposition and analysis criteria;

c) Solve, with the respective airspace users, the duplicate or illegal 24-bit Address cases identified, and inform in this respect to the ICAO Regional Offices;

d) Inform airspace users on any anomaly in the received ADS-B messages, in preparation of future ADS-B implementation; and

e) Duly inform the ICAO Regional Offices on the trial results, for their publication.

4.46 Within the analysis made to the activities, the Meeting identified the need for the non implementation of primary radars, and therefore updated the *Unified surveillance strategy for the CAR/SAM Regions* included in **Appendix F** to this part of the Report. In this sense, the mentioned strategy as regards short- and medium-term was approved. For the long term operations suggested in the strategy, the Meeting recognized the need of identifying the operational scenario scheduled for said period and agreed that the GREPECAS CNS/ATM Subgroup, through its ATM experts, include the task of developing a document showing the foreseen operational scenario(s) in CAR/SAM Regions, mainly for the 2015-2025 timeframe, to guide the evolution of the surveillance systems and to update the long term operations described in the document on the *Unified surveillance strategy for the CAR/SAM Regions*.

4.47 The Secretariat informed of an ICAO State letter regarding guideline material on the sustainability of the 1030/1090 MHz RF environment, incorrect SSR practices from some military authorities and, guidelines on transponder ground testing, ref. SP 44/1-09/88; for which draft conclusions SUR/TF/3-03, 04 and 05 are no longer necessary.

Follow-up to the implementation to the CNS Committee work programme and presentation of pending CNS activities

4.48 The Meeting congratulated the Task Forces of the CNS Committee for the progress achieved in their activities, as well as the efficient manner employed to achieve the expected results.

4.49 The CNS Committee ATN, GNSS and SUR Task Forces analyzed, during their respective last meeting after the sixth meeting of the CNS Committee, the progress made in the activities pertaining to their task forces and within the CNS Committee work programme and, as result of the analysis to the terms of reference of the CNS/ATM Subgroup:

a) Considered which of the activities should continue within the work programme of the new CNS/ATM Subgroup; and
b) Proposed new activities and deliverables necessary to support the performance objectives agreed upon and included in the terms of reference of the CNS/ATM Subgroup.

4.50 In addition, the analysis to the progress made in the activities of the CNS Committee work programme not under the umbrella of the Task Forces, such as the digital networks interconnection/integration and the development and application of a VDL, were carried out through events such as coordination meetings (MEVA II/REDDIG) and the seminar on ATN ground-ground and ground-air applications, Dominican Republic, November 2009.

4.51 As regards the progress made in the activities of the GNSS, ATN and SUR Task Forces, the Meeting took note of the pending and new activities for their inclusion in the work programme of the new CNS/ATM Subgroup, including them in the work programme of the Subgroup, developed under Agenda Item 5.

MEVA II / REDDIG interconnection

4.52 The Meeting took note that the MEVA II / REDDIG interconnection Works in Colombia and Venezuela had been completed, remaining completion of implementation of the AFTN circuits with United States. The lack of implementation of these circuits was due to local works at the San Juan and Miami nodes, which would be finished by the end of March 2010.

4.53 **Appendix G** presents the updated action plan for implementation of MEVA II and REDDIG interconnections, and **Appendix H**, the focal points for coordinating the implementation of the action plan for MEVA II/REDDIG interconnection.

4.54 To complete MEVA II/ REDDIG interconnection at the COCESNA MEVA II node, the delegate from COCESNA indicated that by the end of March 2010 they would be signing the project between ICAO and COCESNA for MEVA II / REDDIG interconnection.

Follow up of actions in the CAR/SAM regions in support of the ICAO position at the 2012 World Radiocommunication Conference (WRC-2012)

4.55 The meeting recalled that for the appropriate radio spectrum to be available worldwide on a timely and continuous manner, aviation requirements regarding the radio frequency spectrum must be broadly supported by all ICAO Contracting States at all international fora where the issue of spectrum allotment is discussed, so as to ensure that all requirements concerning vital aviation safety services are duly presented and understood.

4.56 In this regard, the meeting was informed on lessons learned that made possible the positive results obtained in the World Radiocommunications Conference WRC-2007, among which the activities carried out by ICAO in preparation for this conference such as opportune diffusion/consciousness of ICAO position and the active participation of Contracting States within meetings related to ITU, and in the same Conference, as well as meetings of the ACP working groups, and the radio frequency seminars organised by ICAO in the Regions.

4.57 The meeting took note that ICAO final position for WRC 2012 was informed since 30 June 2009, ref. State Letter E 3/5-09/61 and that this is posted on the ICAO panel website: http://www.icao.int/anb/panels/acp/repository/ICAO_Pos_WRC11_State_Letter.pdf. Likewise, the meeting recalled the support received from States, reflected in GREPECAS Conclusion 15/46 (*CAR/SAM regional action in preparation for, and support to, the ICAO position at the WRC 11) and* Conclusion NACC/DCA/3/6 *– Support by NAM/CAR States to the position of ICAO at the ITU WRC-11*.

4.58 In this regard, the ICAO Regional Offices have conducted the necessary actions with States/Territories for updating the CAR/SAM frequency assignment lists, and have compiled a list of focal points from CAR/SAM States/Territories for active participation in CITEL meetings and in meetings and seminars convened by ICAO to explain and analyse the position of this organisation at the WRC-12, and participate actively at the WRC-12 in support of the ICAO position. **Appendix I** to this Agenda Item includes the referred list.

4.59 The meeting urged States/Territories and International Organizations to participate in two events organized by ICAO: a) workshop on the management of the radio electric spectrum for aviation and the preparatory work for the WRC-2012 ("ICAO NAM/CAR/SAM regional preparatory meeting (NCSRPM) for the ITU WRC-2012"), and b) the 22nd meeting of Working Group F of the Aeronautical Communications Panel (ACP-WG/F). Both events to be held at the ICAO NACC Office in Mexico City, Mexico: the NCSRPM meeting on 21-22 April 2010, and the ACP-WG/F meeting on 23-30 April 2010.

4.60 In this respect, particularly regarding WRC-2012 agenda item 1.3 related to *"review of spectrum needs and the possible normative measures, including attributions, to permit the safe operation of un-crewed aircrafts (UAS), based in results of ITU-R studies, in conformity with Resolution 421 (WRC-2007)"*, the meeting raised the need to have more information regarding dispositions for the operation of un-manned aircraft (UAS) in non-segregated airspaces , which was informed were under elaboration by ICAO such as the Study Group on un-manned Air Systems and the ACP.

Analysis of the DME/DME navigation infrastructure in support of PBN

4.61 The Meeting took note of the need to establish necessary actions in order to evaluate the DME coverage of States, and determine the number of new facilities required to give compliance to the implementation of RNAV procedures.

Combined use of SBAS and GBAS to minimise problems in the ionosphere during precision approaches

4.62 The Meeting noted that the use of SBAS monitoring capacity over wide or regional area could alert with sufficient anticipation the air navigation service providers regarding the proximity and arrival of a disruption in the ionosphere (especially in cases of scintillation) that moves from East to West of an airport equipped with GBAS, in such a way to contribute with authorities in applying the corresponding and timely measures to mitigate these problems produced to GBAS when arriving to the corresponding local ionosphere zone of this system, interrupting its service. The use of this SBAS capacity will contribute to establish operational criteria on the GBAS.

4.63 The meeting recalled that, according with GNSS SARPS contained in ICAO Annex 10, Volume 1, "GNSS navigation service will be provided through different combinations of GNSS elements installed on ground, on board of satellites or on board of the aircraft"; SBAS and GBAS are among these GNSS elements. Nevertheless, the Secretariat expressed that this issue will be transmitted to the ICAO Navigation Systems Panel (NSP) for its consideration.

Plans for Federal Aviation Administration packet switched network (X.25) decommissioning

4.64 The Federal Aviation Administration (FAA) informed about the actions being taken to decommission its internal National Airspace Data Interchange Network (NADIN) X.25 Packet Switched Network (PSN) and of the transference of the national users to a private network under IP Protocol, as well as support to X.25 links and IP for international AFTN and AMHS message traffic, rerouting existing international connections to KATL (Atlanta, GA) and KSLC (Salt Lake City, UT) centres.

4.65 KATL and KSLC serve as the primary U.S. Aeronautical Fixed Telecommunication Network (AFTN) message switching centres and are being enhanced to offer Aeronautical Message Handling System (AMHS) services for both Open System Interconnection (OSI) and Internet Protocol Suite (IPS) transports. They are also the primary locations for the FAA's National Enterprise Management Center (NEMC), which provides 24x7 monitoring, and control of critical network and application functions.

4.66 For this rerouting of MEVA II satellite data connections, the FAA plans to commission a new MEVA II ground station at Atlanta, Georgia, to be co-located with the KATL centre. Presently, evaluations to determine installation date of this equipment are being held.

Updating of CNS SARPS and future work of ICAO expert panels

4.67 For the consideration of the future works of the CNS/ATM Subgroup, the Secretariat presented a summary of the last amendments applicable to Annex 10 and other CNS related documentation, proposal of amendments and future work of ICAO experts panels on CNS aspect and a brief description of other relevant CNS aspects for consideration of the meeting. Details of this information are presented in IP/06 of this meeting.

Implementation of the new ICAO Flight Plan Form (FPL)

4.68 The Meeting recalled GREPECAS Conclusion 15/35 to implement Amendment 1 to the PANS-ATM (15th edition) on the ICAO flight plan model format to comply with aircraft needs with advanced capabilities and requirements developed of air traffic management (ATM) automated systems, taking into account at the same time compatibility with existing systems, human factors, training, cost and transition aspects.

4.69 With the aim of supporting global coordination efforts, States/Territories/International Organizations should adopt the implementation strategy in **Appendix J** to this part of the Report, which was examined during the Meeting by an ad-hoc group composed by Brazil, Dominican Republic, United States and Uruguay, and make the necessary efforts to ensure continuity of operations during the transition period, considering that the flight plan information presented is essential for the ATM System. Likewise, coordination should be made of their implementation plans with ICAO NACC and SAM Regional Offices, with sufficient time in advance to the valid date, so that airspace users and ANSPs may coordinate and resolve any unexpected situation.

4.70 The strategy also contains a macro analysis of the impact in automated or non-automated ATM systems, as well as in data communication systems, both technical and operational in the CAR/SAM Regions. At the same time, it analyses the operational impact and establishes criteria for the preparation during transition and post-transition, as well as administrative and financial aspects. Also, it presents a performance objective which identifies deadlines and individual parts responsible to monitor the progress, so as to achieve a successful and coordinated implementation of the new flight plan format. The Meeting decided upon the approval of a project for the implementation of the new flight plan format, Amendment 1 to ICAO Document 4444, 15th edition.

4.71 To ensure an effective coordination, by States/Territories/International Organizations should nominate points of contact (POC) which shall become the link between ICAO and States/Territories/International Organizations to exchange information on FPL implementation matters.

4.72 The Meeting also took note that ICAO has developed a website called Flight Implementation Tracking System (FITS), where the status of implementation of the new regulations in all flight information regions (FIRs) will be registered. Information related with the matter, and implementation dates will be uploaded into this website, which will be available so that points of contact designated by States/Territories/International Organizations exchange information on this matter.

4.73 To ensure that States/Territories/International Organizations carry out a timely and homogeneous transition, from the current to the new ICAO FPL format, the Meeting adopted the following draft Conclusion:

Draft
Conclusion CNS/ATM/1-8 Implementation of the new flight plan format in the CAR/SAM Regions

That, considering the importance of the implementation of Amendment 1 to the Fifteenth Edition of Doc 4444, whose application is foreseen for 2012, CAR/SAM States/Territories/International Organizations:

a) Adopt the strategy for the implementation of Amendment 1 to Doc 4444 (PANS-ATM) (15th edition) shown in Appendix J to this Agenda Item;

b) Develop action plans, taking into account the regional strategy and the action plan based in a performance scope, which includes as Appendix J to this working paper, for the harmonious implementation of the new ICAO flight plan format and the ATS messages related;

c) Designate experts who participate as points of contact to coordinate with other air navigation services providers of States/Territories/International Organizations from adjacent flight information regions (FIRs), implementation matters of ATS messages related with the implementation of the new ICAO flight plan format (FPL); and

d) Send the result of this implementation to the ICAO NACC and SAM Regional Offices, not later than 30 November 2011.

4.74 The Meeting took note of the importance that States start of make progress in the whole process of socializing and making all aircraft operators (users) aware on the use of the GNSS navigation systems, as well as on the use of the technology on data transmission.

APPENDIX A

CARIBBEAN/SOUTH AMERICAN AIR TRAFFIC FLOW MANAGEMENT MANUAL

(CAR/SAM ATFM MANUAL)

Version 1.0	
Date	**March 2010**

FOREWORD

The *Caribbean/South American (CAR/SAM) ATFM Manual* is published by the ATM/CNS Subgroup of the Caribbean/South American Regional Planning and Implementation Group (GREPECAS). It describes air traffic flow management practices and procedures to be applied in the CAR/SAM Regions.

The GREPECAS and its contributory bodies will issue revised editions of the Document as required to reflect ongoing implementation activities.

Copies of the *CAR/SAM ATFM Manual* can be obtained by contacting:

ICAO South American Office

Victor Andres Belaunde 147
Torre Real 4, Piso 4
Lima 27, Peru
Postal Address: P. O. Box 4127, Lima 100, Peru
Tel: +511 611-8686
Fax : +511 611-8689
E-mail: mail@lima.icao.int
Web site: www.lima.icao.int
Point of contact: E-mail : jfernandez@lima.icao.int; aorero@lima.icao.int

ICAO North American, Central American and Caribbean Office

Av. Presidente Masaryk 29 – 3rd floor
Col. Chapultepec Morales
11570 México D.F., México
Postal Address: Apartado Postal 5-377, 06500 México, D.F., Mexico
Web site: www.mexico.icao.int
Tel: +5255 5250 3211
Fax: +5255 5203 2757
icao_nacc@mexico.icao.int
Point of contact: E-mail: vhernandez@mexico.icao.int

The present edition (Draft Version 1.0) includes all revisions and modifications until July 2009. Subsequent amendments and corrigenda will be indicated in the Record of Amendment and Corrigenda Table, according to the procedure established in page X.

Table of Contents

Chapter 1: Background

1.1 ICAO CNS/ATM Systems received support from the Tenth Air Navigation Conference held in 1991 at ICAO Headquarters in Montreal, Canada. The same year, the CAR/SAM Regional Planning and Implementation Group (GREPECAS) started to work towards a regional application of this new air navigation services concept.

1.2 Further, at the Eleventh Air Navigation Conference (AN-Conf/11, Montreal September 2003), States supported and approved the new ICAO ATM Global Operational Concept, which encourages the implementation of a services management system which enables an operationally continuous regional airspace through the application of a series of ATM functions.

1.3 As per the guidance principles established by ICAO Council with regard to the facilitation of the inter-regional harmonization, the regional plans for CNS/ATM systems implementation in the regions should be prepared in accordance to the general profiles defined in the Global Air Navigation Plan for CNS/ATM Systems. After a careful analysis of the guidance principles of this Global Plan, GREPECAS adopted them and incorporated characteristics inherent to the CAR/SAM Regions, using as a basis the definitions of Homogeneous Areas and Main Traffic Flows. Homogeneous areas are those airspace portions with ATM requirements and similar complexity degrees, while main air traffic flows are airspaces where a significant amount of air traffic exists.

1.4 From the analysis carried out by ICAO/UNDP Project RLA/98/003, it may be inferred that while in general terms in the CAR/SAM Regions environment, currently no traffic congestions are registered requiring a complex flow management, they have been identified in some airports and airspace sectors, mainly in special periods and specific hours, where some congestions are already produced, which should be avoided.

1.5 In view of the above, GREPECAS considered that the early implementation of the ATFM shall ensure an optimum air traffic flow towards some areas or through them, during periods in which the demand exceeds or is foreseen to exceed the available capacity of the ATC system. Therefore, an ATFM system should reduce aircraft delays both in flight and ground and avoid system overloading. The ATFM system shall assist the ATC to comply with its objectives and achieve a more effective utilization of the airspace and airports available capacity. ATFM should also ensure that air operations safety is not compromised in case unacceptable levels of air traffic congestion occur and at the same time ensure that air traffic is effectively administered without applying unnecessary restrictions to flow.

1.6 The ATFM/TF/5 Meeting examined the draft ATFM Manual to be applied by the CAR/SAM Region FMU/FMP, which contained guidelines related with ATFM implementation, such as demand and capacity, traffic management tools, traffic Management initiatives (TMI), Communications and coordination, organization and structure, system performance measurement, collaborative decision-making, common ATFM terminology whose aim was to provide orientation in ATFM management.

1.7 The document was in its initial stage and the Meeting agreed that it would be convenient to continue with its development. Subsequently, a number of the States that participated in ATFM/TF/5 reviewed the document and brought the work forward to its current version.

Overview of Changes Made to Draft ATFM Manual

1.8 The objective was to review and enhance the draft ATFM Manual that resulted from the Fifth Air Traffic Flow Management Task Force Meeting (ATFM/TF/5) held in Armenia, Colombia, 8-12 June 2009.

1. Document reformatted, chapters 1-8 renamed and re-sequenced for continuity.

2. History of document was included with background information.

3. ATFM Stages updated and examples provided.

4. Included was “Centralized ATFM strategy for CAR/SAM Regions”.

5. “Concepts to consider” incorporated.

6. Chapter 3, Organization and Structure enhanced.

7. Chapter 4, Demand, Capacity and Impact Analysis: “Guidelines for application of a methodology for calculation of airport and ATC sector airspace capacity for the CAR/SAM Regions.” Also, added was a paragraph regarding pre/post event actions/analyses.

8. Chapter 5, Traffic Management Initiatives (TMIs); purpose, description of TMIs, explanation of approval authority, and processing added.

9. Chapter 6, Collaborative Decision Making Process (CDM); reorganized and” enhanced.

10. Chapter 7, Coordination; enhanced to depict model and explanation 11. Chapter 8, Common ATFM Message Terminology; enhanced to include examples.

11. The following appendices were included:

    - Trinidad and Tobago ATFM organizational structure
    - Flow Chart ATFM Analyses
    - Screen-shots of ATFM tools; i.e., SYNCHROMAX, PROSAT and TFMS
    - International Operations Planning Teleconference.

Chapter 2: Purpose

2.1 Implementation of Air Traffic Flow Management (ATFM) in CAR/SAM Regions

2.1.1 The purpose of this document shall be to assist the States/Territories of the CAR/SAM Regions to establish a common understanding of the roles of each party interested in the effective provision of the flow management service, capacity to air traffic services, and to aircraft operators.

2.1.2 The intent of this document is to function as an introduction and not as an all inclusive body of knowledge. It is implied that this will be considered a living document that will be modified as needed to reflect the growth, future needs and harmonization of the CAR/SAM Regions.

2.2 ATFM implementation strategy

2.2.1 The operational concept establishes a simple implementation strategy. It is recommended that this strategy be developed in phases, so as to ensure maximum utilization of the available capacity and enable all concerned parties to obtain sufficient experience.

2.2.2 The experience acquired in other Regions and by some States in the CAR/SAM Regions permits States/Territories and International Organizations to apply basic ATFM procedures in airports, without the immediate need for a Regional ATFM Center. A Regional ATFM Center shall demand ample studies to define operational concepts, requirements of systems and institutional aspects for ATFM implementation in the CAR/SAM Regions.

Note: For additional details, see Caribbean/South America Air Traffic Flow Management Operation (CAR/SAM ATFM CONOPS).

2.3 Centralized ATFM strategy for CAR/SAM Regions

2.3.1 GREPECAS/13 was of the opinion that two CAR and SAM scenarios should be taken into account, but that they could be modified insofar as the operational concept development and the implementation plans progress. The strategy is to develop a harmonized planning of a CAR and SAM interregional ATFM system.

2.3.2 In the future, in order to maximize terminal and regional efficiency, consideration should be given to the establishment of a Centralized ATFM facility(s) that would have oversight responsibility for providing ATFM service.

2.3.3 It was also considered necessary that the procedures during all the implementation process be developed in a harmonious manner among the ATFM units to avoid risking operational safety. This entails establishing a regional and interregional strategy to facilitate and harmonize all the implementation process.

2.4 ATFM stages

2.4.1 Initially ATFM initiatives may only be required during certain periods when aerodromes and ATC sectors experience delays due to demand and capacity related issues. In order to maximize the use of all resources available in the regions, either from personnel, equipment, facilities and/or automated systems, the ATFM implementation process should be established, planned and developed in phases (airport and airspace), according to the following sequence.

Note: Doc 9854, Global Air Traffic Management Operation Concept defines the ATFM stages.

2.4.2 **Strategic stage**. At the strategic stage, demand and capacity balancing will respond to the fluctuations in schedules and demands, seasonal changes of weather and major weather phenomena, and special traffic management events such as Carnival. This takes place seven days or more prior to the day of operation and includes research, planning and coordination activities. This phase consists of analyzing the evolution of the forecast demand and the identification of potential new problems and in evaluating possible solutions. The outputs of this phase are the capacity plan for the following year, the Route Allocation Plans and sets of other plans that can be activated as necessary during the next phases. Through collaborative decision making, assets will be optimized in order to maximize throughput, thus providing a basis for predictable scheduling.

2.4.2.1 For example: The ATFM service provider in anticipation of an event would gather statistical data and discuss this with stakeholders for the development of an action plan. This plan should take into consideration both scheduled and non-scheduled FPLs.

2.4.2.2 This could include a special traffic management event such as a sporting event, or a planned outage that would impact airport/airspace capacities. The integral part of the strategic phase is to mitigate impact as much as possible through advance planning.

2.4.3 **Pre-tactical stage**. Applied six days prior to the day of operation and includes revisiting the strategic phase. It analyses and decides the best way to manage the available capacity resources and the need for the adjustment of TMIs. For example, this may include demand and capacity balancing, evaluation of the current capabilities of the ATC service provider, airspace user and aerodrome operator assets.

2.4.3.1 In the pre-tactical phase, you are required to revisit the strategic plan and make appropriate adjustments as needed based upon newly received/changed information.

2.4.4 **Tactical stage**. At the tactical stage, demand and capacity balancing will focus more closely on demand management to adjust imbalances. It will consider weather conditions, infrastructure status, resource allocations, and disruptions in schedules that would cause an imbalance. Through collaborative decision making, these actions will include dynamic adjustments to the organization of airspace to balance capacity, dynamic changes to the entry/exit times for aerodromes and airspace volumes, and adjustments to the schedules by users.

2.4.4.1 Tactical stage includes making appropriate real time adjustments based upon unanticipated factors and informing stakeholders of these changes.

2.5 **Concepts for consideration**

2.5.1 ATFM shall be established with a view to optimizing the use of available airspace and airport capacity, and to enhance air traffic flow management processes. It shall be based on transparency and efficiency, ensuring that capacity is provided in a flexible and timely manner, consistent with the guidelines issued by ICAO.

2.5.1.1 Implementation shall support cooperation between air navigation service providers, airport operators and airspace users and shall cover the following areas:

a. flight planning
b. use of available airspace capacity during all flight phases
c. Issuing guideline initiatives for the optimization for the flow of air traffic

2.5.2 Implementation shall seek to balance the financial benefits for stakeholders with the expected operational safety improvements by the relevant parties and operational and technical benefits, taking into account the requirements for ATM global interoperability.

2.5.3 The following operations shall be excluded from the implementation of ATFM initiatives

a. State aircraft (Special military missions)
b. Emergency/priority aircraft
c. ambulance flights
d. humanitarian flights (ambulance flights)
e. Search and rescue missions
f. Transport of human organs

Note: For additional details, see Caribbean/South America Air Traffic Flow Management Operation (CAR/SAM ATFM CONOPS).

2.5.4 It shall be recognized that airspace and airports are resources shared by all user categories with fairness and transparency, taking into account the operational safety needs of States and the commitments of international organizations.

2.5.5 Air traffic flow management should be based on principles of partnership to meet ATM expectations, by means of collaborative decision-making between:

a. Central units for air traffic flow management (ATFMC)
b. Flow Management Units (FMU/FMP)
c. Airspace users – general aviation, air carriers, the military
d. Aerodrome community

2.5.6 Air navigation service providers and air operators should share data when coordination agreement has been established. Examples include SYNCHROMAX, PROSAT, and TFMS (formerly ETMS)

2.5.7 ATFM shall apply within CAR/SAM States airspace and airports to:

a. all flights intended to operate or operating as general air traffic and in accordance with instrument flight rules (IFR) except as noted in paragraph 2.5.3 above.

b. all phases of those flights.

2.5.8 ATFM shall apply to each of the following parties, or to anyone acting on their behalf who may be involved in air traffic flow management activities:

a. aircraft operators
b. air traffic service providers
c. units involved in airspace management
d. airport operators
e. the central unit entrusted by Member States with the provision of air traffic flow management services.

Chapter 3: Organization and Structure

3.1 It is understood that each State and/or service provider will develop an organizational structure that will meet the needs of the aviation system community. These needs at a minimum should address management and oversight of the following:

a. Air Traffic Flow Management System
b. Coordination/exchange of information both internal and external
c. Provide line authority as to how decisions are implemented
d. Ensure that mission requirements are met

3.2 Each organization may establish a Line of Authority that will support the mission of ATFM. This may include the following positions of responsibilities:

a. Manager of Traffic Flow Management System
b. Flow management unit that provides oversight for a specific geographic region and/or facilities
c. Flow management positions that are responsible for the day-to-day activities of traffic flow management

Note: Please see **Appendix A** for an example of the Trinidad and Tobago Civil Aviation Authority Flow Diagram of Piarco Flow Management Unit

3.3 Flow Management Unit (FMU)

3.3.1 FMUs monitor and balance traffic flows within their areas of responsibility in accordance with traffic management directives. The FMU is delegated the authority to direct traffic flows and implement approved traffic management initiatives (TMIs) in conjunction with, or as directed by, the oversight authority.

3.4 Personnel requirements for FMU/FMP ATFM

3.4.1 Personnel working in a Centralized ATFM function as well as regional FMU/FMP functions shall require standardized and recurrent training in order to keep pace with an ever changing and fluid environment. A detailed plan of ATFM training in advance shall ensure the optimization of personnel achieving operational efficiency in their respective FMUs/FMPs. This will allow them to successfully face the important changes in their operational environments and allow them to provide the highest achievable level of customer service.

3.4.2 FMP Duties may include:

a. Create and distribute plan of action after consultation with designated facilities and customers
b. Gather all relevant information such as weather, delays, NAVAID/radar shutdowns, runway closures, TELCO outages, computer malfunctions, and procedural changes affecting air traffic facilities. This may be accomplished through various means available; e.g., teleconference, email, internet.
c. Analyze and distribute all data.
d. Record in a designated log a full description of all TMIs (e.g., ground delay programmes, ground stops, miles-in-trail) which may include, but not limited to, start and stop times, facilities/operations affected, and justification.

e. Coordinate procedures with all stakeholders.
f. Create a structure for dissemination of information; e.g., ATFM webpage.
g. Conduct daily teleconferences as needed.
h. Monitor/review the flow management system, make adjustments where necessary, and cancel when no longer required.

Chapter 4: Demand, Capacity and Impact Analysis Planning Process

4.1 In order to balance demand with capacity, it is necessary to determine the airport and airspace capacity. Once these capacities are established, steps can be taken to monitor and evaluate air traffic demand and implement measures (e.g., TMIs) for achieving equilibrium in the system.

4.2 The following example provides a general concept of the steps involved regarding ATFM pre-event planning/actions and post-event analysis. Please see **Appendix B** ATFM flow chart analysis.

a. **Determine Capacities**
Review/assess airport/ATC sector capacities for accuracy.
Note: See Guidelines for the Calculation of Airport and ATC Sectors for the CAR/SAM Regions.

b. **Assess Demand**
Determine what forecasted demand will be for a specified time frame, 15-minute period(s), hour(s), shift, etc.

c. **Analyze and Compare**
Analyze and compare demand and capacity levels and time frames where demand is projected to exceed declared capacity.

Tool/technology for the analysis process
Manual computation or automated methodologies such as SYNCHROMAX, TFMS, PROSAT can be used to facilitate the demand/capacity analysis process. (See **Appendix D**).

d. **Communicate situational information**
Communicate situational information to facilities/stakeholders via available means utilizing Collaborative Decision Making (CDM) methodology. (See **Appendix E** regarding a model for CDM structure).

e. **Determine the action required to mitigate demand imbalance**
After gathering information and soliciting input, determine appropriate traffic management initiative (TMI) needed for situation.

f. **Disseminate TMI information**
Inform stakeholders of TMI planned to mitigate the situation. This can be accomplished via telephone and/or automation.

g. **Monitor the situation**
Examine the situation periodically in order to ensure the applied TMIs are mitigating the situation. If necessary, re-evaluate and make the appropriate adjustments.

h. **Conduct post analysis of event**
Afterwards, perform post-event analysis to determine the effectiveness of the TMIs and catalog best working practices.

Chapter 5: Traffic Management Initiatives (TMIs)

5.1 TMIs are techniques used to manage air traffic demand according to system capacity. Some TMIs must be considered as control instructions or procedures. The determination is based on the size of the event, the coordination process, and the event duration.

5.2 Purpose

5.2.1 TMIs are important techniques for managing the air traffic system when they are coordinated and applied properly. TMIs are applicable when it is necessary to manage fluctuations in the air traffic demand, but they do cause an impact to the customers. It is important to consider this impact and implement only the initiatives that are necessary for maintaining the integrity of the system. Therefore, traffic management personnel should employ the least restrictive methods available in order to minimize delays.

Note: In certain instances it may be necessary to apply combinations of TMIs in order to maintain system integrity and still employ the least restrictive measures; e.g., miles-in-trail with holding in lieu of ground stopping aircraft.

5.3 Types of TMIs

Name	Description
Airborne holding	Holding of aircraft is a commonly utilized TMI especially when anticipated due to volume, weather, outages etc. When airborne holding is forecasted, AT facilities and customers can make appropriate adjustments and alert personnel as to the reasons and length of holding. Airborne holding is normally done when the operating environment supports holding and the conditions are expected to improve shortly; this ensures aircraft are available to fill the capacity at the airport.
Altitude	Utilized to segregate different flows of traffic, or to distribute the number of aircraft requesting access to a specified geographic region. **a. Capping**: Term to indicate aircraft will be cleared to an altitude lower than their requested altitude until they are clear of a particular airspace. Capping may apply to the initial segment of the flight or for the entire flight. **b. Tunneling**: Term to indicate traffic will be descended prior to the normal descent point at the arrival airport to remain clear of an airspace situation; e.g., holding. Capping and Tunneling are techniques commonly used to keep aircraft from entering busy and complex sectors and still permitting them to depart with minimal delays.
Fix balancing	Assigning an aircraft a fix other than that in the filed flight plan in the arrival or departure phase of flight to equitably distribute demand.
Ground delay programme (GDP)	A GDP is a TM process administered by the FMU, when aircraft are held on the ground in order to manage capacity and demand at a specific location, by assigning arrival slots. The purpose of the programme is to support the TM mission and limit airborne holding. It is a flexible programme and may be implemented in various forms depending upon the needs of the air traffic system.

Name	Description
Ground stops (GS)	GS is a process that requires aircraft that meet specific criteria to remain on the ground. Since this is one of the most restrictive methods of traffic management, alternative initiatives should be explored and implemented if appropriate. GSs should be used: **a.** In severely reduced capacity situations (below most user arrival minimums, airport/runway closed for snow removal, or aircraft accidents/incidents); **b**. To preclude extended periods of airborne holding; **c**. To preclude sector/center reaching near saturation levels or airport grid lock; **d**. In the event a facility is unable or partially unable to provide ATC services due to unforeseen circumstances; and **e**. When routings are unavailable due to severe weather or catastrophic events.
Miles-in-trail (MIT)	The number of miles required between aircraft that meet a specific criteria. The criteria may be separation, airport, fix, altitude, sector, or route specific. MIT are used to apportion traffic into manageable flows, as well as to provide space for additional traffic (merging or departing) to enter the flow of traffic.
Minutes-in-trail (MINIT)	The number of minutes required between successive aircraft. It is normally used in a non-radar environment, or when transitioning to a non-radar environment, or when additional spacing is required due to aircraft deviating around weather.
Reroutes	Reroutes are ATC routings other than the filed flight plan. They are issued to: **a.** Ensure aircraft operate with the "flow" of traffic. **b.** Remain clear of special use airspace. **c.** Avoid congested airspace. **d.** Avoid areas of known weather where aircraft are deviating or refusing to fly.
Sequencing programmes	These programmes are designed to achieve a specified interval between aircraft. They may be software generated or determined by ATFM personnel. Different types of programmes accommodate different phases of flight. **a. Departure Sequencing Programme (DSP) -** Assigns a departure time to achieve a constant flow of traffic over a common point. Normally, this involves departures from multiple airports. **b. En route Sequencing Programme (ESP) -** Assigns a departure time that will facilitate integration in the en route stream. This is accomplished by instructing an air traffic control tower to call the traffic management unit for release **--** "Call For Release." **c. Arrival Sequencing Programme (ASP) -** Assigns fix crossing times to aircraft destined to the same airport.

5.4 **TMI approval authority**

5.4.1 The designated FMU/FMP for each Service provider and/or State is the approval authority for all TMIs that impact their airports, TMAs, and en route airspace system.

5.5 **TMI processing**

5.5.1 Prior to implementation, the FMU/FMP responsible for ATFM oversight must identify the need for a TMI, examine alternative options, and develop a justification for the TMI. The FMP must be prepared to discuss and coordinate the proposed TMI with the receiving facility prior to implementation. FMPs must continuously monitor and evaluate the TMI and make the necessary adjustments, including cancellation and notification in a timely and effective manner.

Chapter 6: Collaborative Decision Making Process (CDM)

6.1 CDM has evolved into a philosophy or a collaborative approach of how to conduct business. It brings together operators, government, private industry, military, and academia, for the purpose of improving ATFM decision making through enhanced information exchange, data sharing, and improved automated decision support tools.

6.2 As the aviation community continues to evolve, States and/or service providers will be required to keep pace with increasing demand levels, expanding capacities, and technological advances. As a result of these challenges, a new sense of partnership will be required by all stakeholders who either directly or indirectly contribute to the overall well being and success of the aviation industry.

6.3 This new partnership will combine the talents and experiences of all individuals which will facilitate the harmonization and globalization of the world's airspace system.

6.4 Collaborative decision making (CDM) is a methodology that brings service providers and system stakeholders together for the purpose of improving air traffic flow management decisions.

6.5 CDM is a key element to maximizing airport and air operations because it considers all coordination elements between air navigation service providers such as flow management units (FMUs) and recipients of these services such as aircraft and airport operators. CDM includes stakeholders participating in the planning process by sharing information such as aircraft position, predictions, weather forecast, traffic forecast, and in general anything that would contribute to the efficient operation of a regional air space system.

6.6 CDM objectives

6.61 The CDM concept seeks to improve air traffic flow and airport capacity management by reducing delays and foreseeing events through improved resource management.

6.6.2 These objectives include but are not limited to:

a. Providing up-to-date information in real time to all stakeholders, thus ensuring a more accurate prediction of events and better capacity utilization, supported by a collaborative decision-making process.

b. Transferring information for decision-making between stakeholders.

c. Requiring that all system stakeholders function in an equitable manner for the betterment of the system.

d. Exchanging information among the relevant parties in charge of aircraft flight planning and operations to increase system capacity, and thus improving:

   1. Operations quality and stability
   2. Offering reliability and predictability
   3. traffic synchronization amongst stakeholders
   4. And air space organization which is critical for maximizing capacity and enhancing system safety.

6.6.3 CDM participants should consider utilizing all available electronic means and tools that allow the analysis of various traffic scenarios in order to more effectively achieve the balancing of demand and capacity.

> *Note:* Global experience has shown that teleconferences and electronic information exchanges are the recommended mechanisms for active participation throughout the System. However, each State/Service Provider may utilize whatever means are available to foster the sharing of information.

6.6.4 CDM implementation allows system participants to optimize their decisions in collaboration with others, by learning about their preferences, constraints, and the real and foreseen situation.

6.6.5 Decision-making within the CDM framework is facilitated by the exchange of accurate and timely information, aiming to adjust procedures, mechanisms and tools for better system performance.

6.6.6 The CDM concept consists of the following basic elements:

a. Information exchange.
b. Weather conditions.
c. Sequencing before departure.
d. Adverse conditions.
e. Up-to-date flight information.
f. Flight scheduling.
g. Airport Master Plan.
h. General Contingency Plans.
i. State aircraft operation planning (military, law enforcement and other).

6.7 CDM structure

6.7.1 Developing a CDM organization within each State and/or Service Provider is essential in order to achieve the benefits that this model offers. The flexibility is that it takes into consideration any communication venues that already exist, and does not require expending valuable resources, and can be tailored to meet the local regional needs as determined.

6.7.2 For example, Service Providers can begin with engaging the stakeholders as follows:

a. Scheduling regular (e.g., quarterly, monthly, weekly) meetings
b. Pre-establishing agenda items that are of mutual concern
c. Discussing how tactical decisions will be managed, shared, and disseminated
d. Establishing CDM participants and entering a memorandum of understanding (MOU) which stipulates guidelines in areas such as information distribution, rules and regulations, and how shared leadership is accomplished.
e. Developing sub-work groups which fall under the direct leadership and guidance of the CDM organization and are specifically tasked with developing solutions.

6.8 Conclusions

6.8.1 As with any collaborative endeavor, each participant should realize that this will require a level of sacrifice, commitment and a sense of what is best for the greater whole and/or system.

6.8.2 Participant must be willing to share:

a. Responsibility
b. Resources
c. Accountability
d. Mutual goals
e. Mutual trust

6.8.3 And as a direct result of these efforts, participants can generally expect to realize:

a. More effective communications
b. Increased information exchange
c. More effective decision making
d. Better solutions to ATFM problems

6.8.4 It is well accepted that regardless of the technological advances made in the aviation industry, CDM will require a culture change, team work approach, and be an integral part of how the future is shaped.

Chapter 7: Coordination

7.1 Coordination of traffic management information

7.1.1 It is understood that there exists different levels of traffic flow management oversight within the CAR/SAM regions. The concept is for each Service Provider to assign responsibility within their respective FIR for collecting, disseminating, monitoring, and providing oversight of TMIs. This methodology would ensure that applicable information is shared by all Service Providers and customers in a timely and efficient manner.

7.1.2 Examples of applicable information include: Tactical level information such as capacities, demand, imbalances, airport conditions and anything that would impact their respective system. This list is not all inclusive and will depend on the good judgment of each facility.

7.1.3 A typical traffic management hierarchy model may consist of the following:

a. Control towers (TWR) coordinate with Approach Control Facilities (APP).
b. Approach Control Facilities (APP) coordinate with an Air Control Center (ACC).
c. Air Control Centers coordinate with ATFM authority.
d. ATFM authority would be responsible for dissemination within their respective region.

Note: The purpose of this coordination methodology is to establish a protocol for each level of the organization to be informed of timely and accurate information. It is fully realized that this as an organizational model and can be modified to meet the needs of each specific situation.

Note: For standardization, it is desirable that the States develop and/or modify letters of agreement (LOA) which describe this coordination.

7.2 Exchanging ATFM information

7.2.1 Air Traffic Service (ATS) and/or ATFM Service Providers in adjacent FIRs should establish schedules and regular telephone conferences, as required, to meet their specific operational needs. The purpose of these conferences is to share and disseminate information to air traffic facilities and customers for making tactical adjustments as required.

7.2.2 It is recommended that the following three methods be utilized:

a. <u>Scheduled telephone conferences</u>. These consist of a pre-coordinated time when FMUs establish a conference amongst themselves to exchange information.
b. <u>Tactical telephone conferences.</u> These are non-scheduled teleconferences which are conducted on a real-time tactical level to make adjustments.
c. <u>Automated Web Pages.</u> ATFM service providers may create web pages with relevant ATFM information, as described in this paragraph. The purpose of the web pages is to share applicable system information for everyone to access and to minimize workload. As a minimum, the web pages may include:

    1. TMI's such as ground stops, delay programmes, etc.
    2. Runway configuration
    3. Runway/airport capacities
    4. Weather
    5. Outages

6. Delay information
7. Airport closures
8. Miscellaneous

7.3 Operations plan

7.3.1 The operations plan may take into consideration the terms of balancing demand and capacity, ATFM initiatives, special operation requirements, special events (such as Carnival, World Cup) and any other events that may arise. The purpose is to tactically and/or strategically develop an outlook for the applicable airspace system that the aviation community can use as a planning forecast. Specific items that may be used are similar to the web page and allow the aviation community to provide input into the development of this plan. For example, an FMU would canvass applicable Air Traffic facilities and customers on how best to resolve system impacts.

7.3.2 Special operations may be defined as air operations conducted by State aircraft or for humanitarian activities. It is implied that each State and/or service provider may define special operations as needed.

7.4 Implementing, adjusting, coordinating, and canceling of TMIs

7.4.1 It is recommended that States and/or service providers develop an internal operations manual for their respective facilities describing the above-mentioned actions. For example:

a. Implementing TMIs could be accomplished through established means such as telephone calls, web pages, or any other available method.
b. Constant monitoring would be required for making the appropriate adjustments.
c. Cancellation of TMI’s would be required when no longer needed or when system balance is achieved regarding demand and capacity related issues. It is important for all system users to be informed of canceled initiatives so that adjustments can be accomplished.

7.5 Civil/military coordination

7.5.1 It is recommended that States and/or service providers develop a letter of agreement (LOA) with their military customers that describes how military special use airspace can be utilized when not in use and/or during peak civilian periods in order to increase efficiency.

Chapter 8: Common ATFM Message Terminology - General

8.1 The primary goal of these guidelines is to develop standard terminology and phraseology for the exchange of ATFM telephone messages. The information contained herein is intended to reflect the current use of plain language and provide a basis for harmonization.

8.2 This includes the concept of modular and structured ATFM messages and define the components as who, what, where, when and why.

8.3 This is important because, at present, there is no module regarding how ATFM restrictions should be achieved by Service Providers. As with any communication model, it is the responsibility of both parties (sender and receiver) to ensure that the message is understood correctly and can be applied as requested.

8.4 It should be recognized that once information is exchanged regarding a restriction, it is considered MANDATORY unless otherwise coordinated.

8.5 **ATFM message components**

8.5.1 Each message should have five components that contain plain language elements and when combined provide a complete ATFM message.

8.5.2 This section breaks down the five message components.

WHO: This identifies the parties involved. Who is transmitting and receiving the message.

Examples: CGNA THIS IS COLOMBIA FMU

CCFMEX THIS IS ATCSCC

WHAT: This identifies the objective to be achieved.

Examples: REQUEST 30 MILES IN TRAIL

REQUEST 5 MINUTES IN TRAIL

WHERE: This identifies the location of the ATFM objective to be achieved. It is often preceded by a modifying clause, indicating what aircraft or traffic the restriction will apply to. The modifying clause and the location combination are used to construct the “where” component.

Examples: FOR ALL AIRCRAFT LANDING EL DORADO INTERNATIONAL AIRPORT

FOR ALL TRAFFIC LANDING HOUSTON INTERCONTINENTAL AIRPORT

WHEN: This identifies the time and/or duration of the ATFM objective to be achieved.

Examples: FROM NOW UNTIL 1700 UTC

FROM 2000 UTC TO 2130 UTC

WHY: This identifies the reason for the ATFM objective:

Examples: DUE TO SEVERE WEATHER OVER
EL DORADO INTERNATIONAL AIRPORT

DUE TO A LONG-RANGE RADAR OUTAGE

The following is an example of a complete message:

CGNA THIS IS COLOMBIA FMU. REQUEST 30 MILES IN TRAIL FOR ALL AIRCRAFT LANDING EL DORADO INTERNATIONAL AIRPORT FROM NOW UNTIL 1700 UTC DUE TO SEVERE WEATHER OVER EL DORADO INTERNATIONAL AIRPORT

Amendment

The amendment of an ATFM message should include similar elements but with additional modifiers. These modifiers may include:

a. CHANGE
b. AMEND
c. REDUCE
d. INCREASE
e. DECREASE

Example: GUAYAQUIL FMP THIS IS LIMA FMP, REDUCE YOUR MILES-IN-TRAIL TO JORGE CHAVEZ INTERNATIONAL AIRPORT FROM 30 MILES-IN-TRAIL TO 20 MILES-IN-TRAIL FROM 1400 UTC TO 1700 UTC DUE TO IMPROVING WEATHER CONDITIONS AT JORGE CHAVEZ INTERNATIONAL AIRPORT

Cancellation

The cancellation of an ATFM message should contain a canceling word or phrase. It is normally not necessary to state the reason for the cancellation. A canceling word or phrase may include:

a. CANCEL
b. RESUME
c. RESUME NORMAL
d. RELEASE

Example: CARACAS FMP THIS IS GEORGETOWN FMP, CANCEL THE GROUND STOP FOR TIMEHRI CHEDDI JAGAN INTERNATIONAL AIRPORT DUE TO THE RUNWAY NOW OPEN.

Cancellation messages should also identify which message is being cancelled because several restrictions could be in place at one time.

ATTACHMENT A

EXPLANATION OF TERMS

The development of this document is based on the understanding of important terms and expressions that are described below:

Stakeholders involved in ATFM - The ATFM stakeholder community includes the organizations, bodies or entities which could participate, collaborate and cooperate in the planning, development, utilization, regulation, operation, and maintenance of ATFM system.

Among them are:

> ***Aerodrome Community* -** The air traffic control authorities, aerodrome authorities, commercial, military, and general aviation operators, and other parties involved in the provision and operation of the physical infrastructure needed to support the take-off, landing, and ground handling of aircraft.
>
> ***Airspace Providers* -** Refers, in general terms, to Contracting States/Territories in their capacity as airspace owners with the legal authority to permit or deny access to their sovereign airspace. The term may also be applied to organizations of the State assigned responsibility for establishing the standards and guidelines for use of the airspace.
>
> ***Airspace users* -** Refers to the commercial, military, and general aviation operators that utilize the sovereign airspace of States/Territories/Organizations.
>
> ***ATM service providers* -** All of the organizations and personnel (e.g., controllers, engineers, technicians) involved in the provision of ATFM services to airspace users.
>
> ***Military aviation* -** Refers to the personnel, aircraft, and equipment of military organizations that serve a vital role in the security of States/Territories.
>
> ***International Civil Aviation Organization (ICAO)* -** Considered the only international organization in position to efficiently coordinate the implementation activities of global ATM.

Air Traffic Flow Management (ATFM) - A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilized to the maximum extent possible and that the traffic volume is compatible with the capacities declared by the appropriate ATC authority.

Air Traffic Management (ATM) - A service which comprises airspace management, air traffic flow management, and air traffic services.

ATM Community - All the organizations, bodies or entities which might participate, collaborate and cooperate in the planning, development, use, regulation, operation and maintenance of the ATM System.

Air Traffic Management System - A system which provides ATM through the integration and cooperation of personnel, information, technology, facilities and services. It also involves the support of on-board and space-based communications, navigation and surveillance.

Air Traffic Volume - The number of aircraft within a defined airspace or aerodrome movement area in a given period of time.

Capacity (for ATFM purposes) - The maximum number of aircraft that can be accommodated in a defined airspace or aerodrome (throughput) in given period of time.

Declared Capacity (for ATFM purposes) – A measure of the ability of the ATC system or any of its subsystems or operating position to provide service to aircraft during normal activities. It is expressed as the number of aircraft entering a specified portion of airspace in a given period of time taking into account weather, ATC unit configuration, staff and equipment available, and any other factors that may affect the workload of the controller responsible for the airspace.

Regional ATFM Center - A flow management unit responsible for the provision of air traffic flow management across multiple area control centers.

Collaborative Decision Making - an operating philosophy and the associated technologies that enable traffic managers and aviation industry representatives to respond in a timely manner to constraints in the airspace system.

Demand - The number of aircraft requesting to use the ATC system in a given time period.

Efficiency - The ratio of the cost of ideal flight to the cost of procedurally constrained flight.

Flow Management Unit (FMU) - FMUs monitor and balance traffic flows within their areas of responsibility in accordance with traffic management directives. The FMU is delegated the authority to direct traffic flows and implement approved TMIs in conjunction with, or as directed by the oversight authority.

Flow Management Position (FMP) - A position established in an appropriate air traffic control unit to ensure the necessary interface between the local ATFM functions and other FMUs and/or a centralized ATFM unit.

Homogeneous ATM area - An airspace with a common ATM interest, based on similar characteristics of traffic density, complexity, air navigation system infrastructure requirements and other specified considerations, wherein a common detailed plan will foster the implementation of ATFM.

Main Traffic Flow - The concentration of a significant volume of air traffic on the same, or similar, flight trajectories.

Routing area - An area that encompasses one or more major traffic flows, defined for the purpose of developing a detailed plan for the implementation of ATM systems and procedures.

Traffic Management Initiatives - Techniques used by traffic managers to balance air traffic demand with available capacity.

ATTACHMENT B

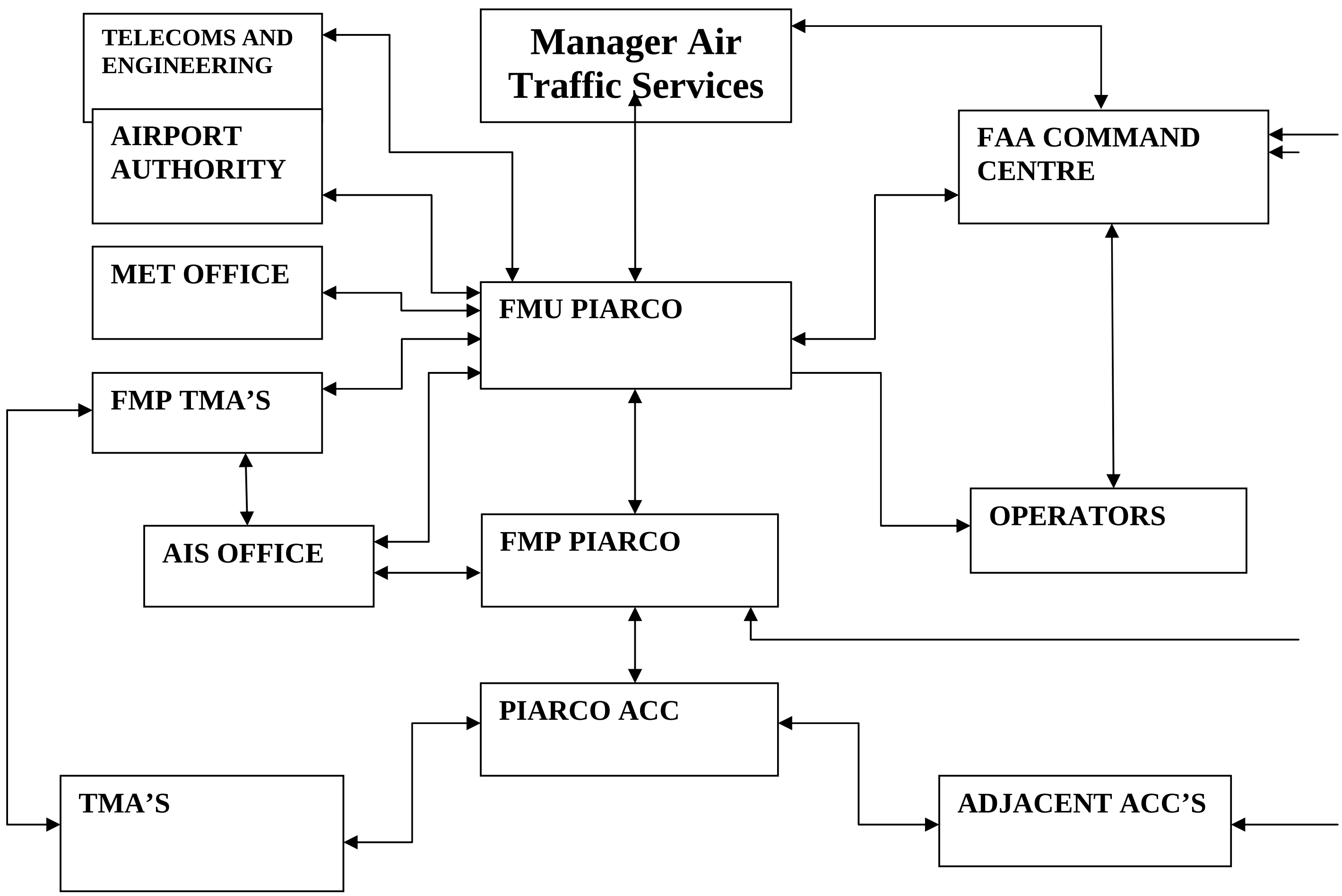
LIST OF ACRONYMS

ACC	Centro de control de área	Area control centre
AFTN	Red de telecomunicaciones fijas aeronáuticas	Aeronautical fixed telecommunication network
AIP	Publicación de Información aeronáutica	Aeronautical information publication
AIS	Servicio de información aeronáutica	Aeronautical information service
ANP	Plan de navegación aérea	Air navigation plan
ANS	Servicios de navegación aérea	Air navigation services
ANSP	Proveedor de servicios de navegación aérea	Air navigation service provider
AO	Explotador de aeronave	Aircraft operator
APP	Oficina de control de aproximación	Approach control facility
AAR	Régimen de aceptación del aeropuerto	Airport Acceptance Rate
ADR	Régimen de salida del aeropuerto	Airport Departure Rate
ATC	Control de tránsito aéreo	Air traffic control
ATFM	Gestión de afluencia del tránsito aéreo	Air traffic flow management
ATM	Gestión del tránsito aéreo	Air traffic management
ATS	Servicios de tránsito aéreo	Air traffic services
CAA	Administración de aviación civil	Civil aviation authority
CAR/SAM	Regiones Caribe y Sudamérica	Caribbean and South American Regions
CATFM	Dependencia central de gestión de afluencia del tránsito aéreo	Centralised air traffic flow management unit
C/BA	Análisis de costo-beneficio	Cost/benefit analysis
CDM	Toma de decisiones en colaboración	Collaborative Decision Making
CNS/ATM	Comunicaciones, navegación y vigilancia/gestión del tránsito aéreo	Communications, navigation, and surveillance/air traffic management
CTA	Area de control	Control area
FDPS	Sistema de procesamiento de datos de vuelo	Flight data processing system
FIR	Región de información de vuelo	Flight information Region
FMP	Puesto de gestión de afluencia	Flow management position
FMU	Dependencia de gestión de afluencia	Flow management unit
FPL	Plan de vuelo	Flight plan
GREPECAS	Grupo regional CAR/SAM de planificación y ejecución	CAR/SAM regional planning and implementation group
IATA	Asociación del Transporte Aéreo Internacional	International Air Transport Association
IFALPA	Federación Internacional de Asociaciones de Pilotos de Línea Aérea	International Federation of Air Line Pilots' Associations
IFATCA	Federación Internacional de Asociaciones de Controladores de Tránsito Aéreo	International Federation of Air Traffic Controllers' Associations
LOA	Carta de acuerdo	Letter of Agreement

MET	Servicios meteorológicos para la navegación aérea	Meteorological services for air navigation
NOTAM	Aviso a los aviadores	Notice to airmen
OACI/ICAO	Organización de Aviación Civil Internacional	International Civil Aviation Organization
PANS ATM	Procedimientos para los servicios de navegación aérea – Gestión de tránsito aéreo	Procedures for Air Navigation Services –Air traffic management
PIRG	Grupo regional de planificación y ejecución	Regional planning and implementation group
PROSAT	Pronóstico de saturación	PROSAT
RNAV	Navegación de área/Area Navigation - RNAV Route: Ruta de navegación de área	Area navigation route
RNP	Performance de navegación requerida	Required navigation performance
SID	Salida normalizada por instrumentos	Standard instrument departure
STAR	Llegada normalizada por instrumentos	Standard instrument arrival
SYNCHROMAX	SYNCHROMAX	SYNCHROMAX
TBD	A ser determinado	To be determined
TELCON	Tele-conferencia	Telephone conference
TFMS	Sistema de gestión de la afluencia del tránsito (previamente, ETMS)	Traffic Flow Management System (previously called ETMS)
TMA	Área de control terminal	Terminal control area
TMC	Coordinador de la gestión del tránsito	Traffic Management Coordinator
TMI	Iniciativa de gestión del tránsito	Traffic management initiative
TWR	Torre de control	Control tower
WSO	Oficina del Servicio Meteorológico	Weather Service Office
WWW	Red mundial	World Wide Web

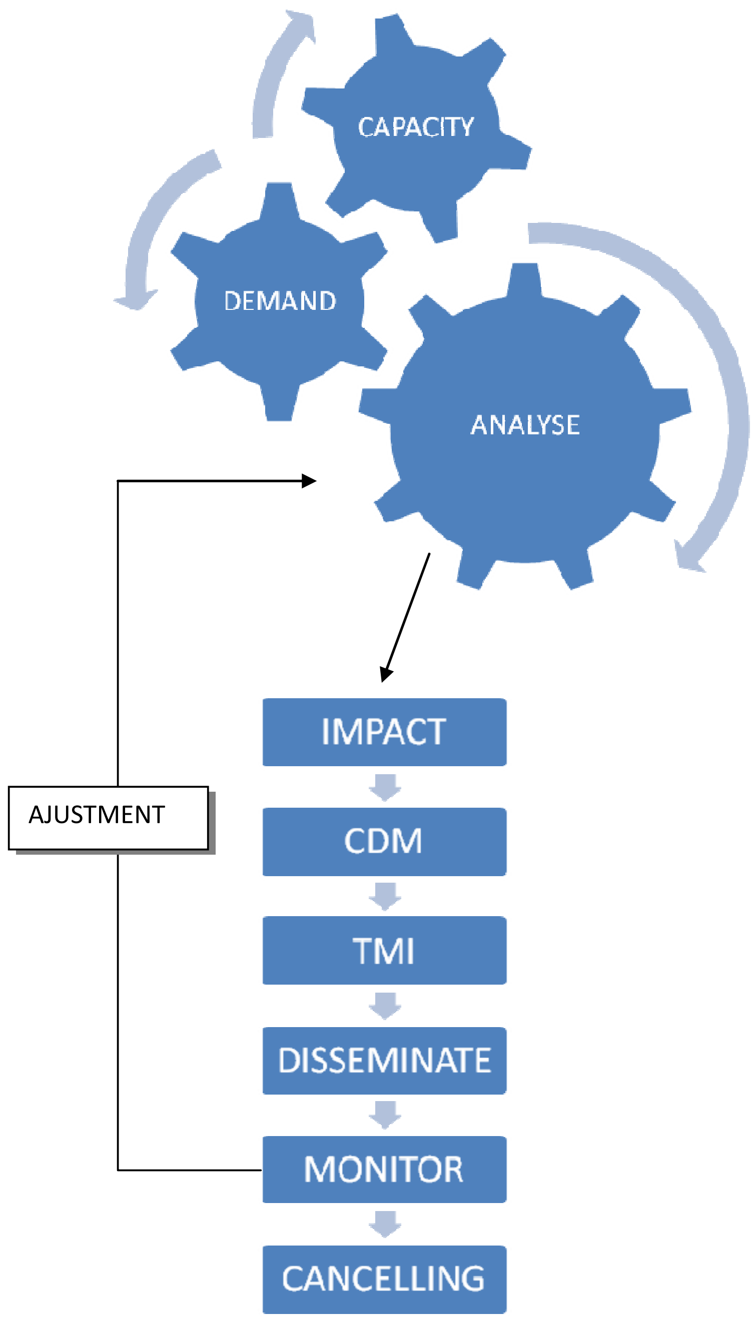
APPENDIX A

Trinidad and Tobago Civil Aviation Authority - Flow Diagram of Piarco Flow Management Unit



APPENDIX B

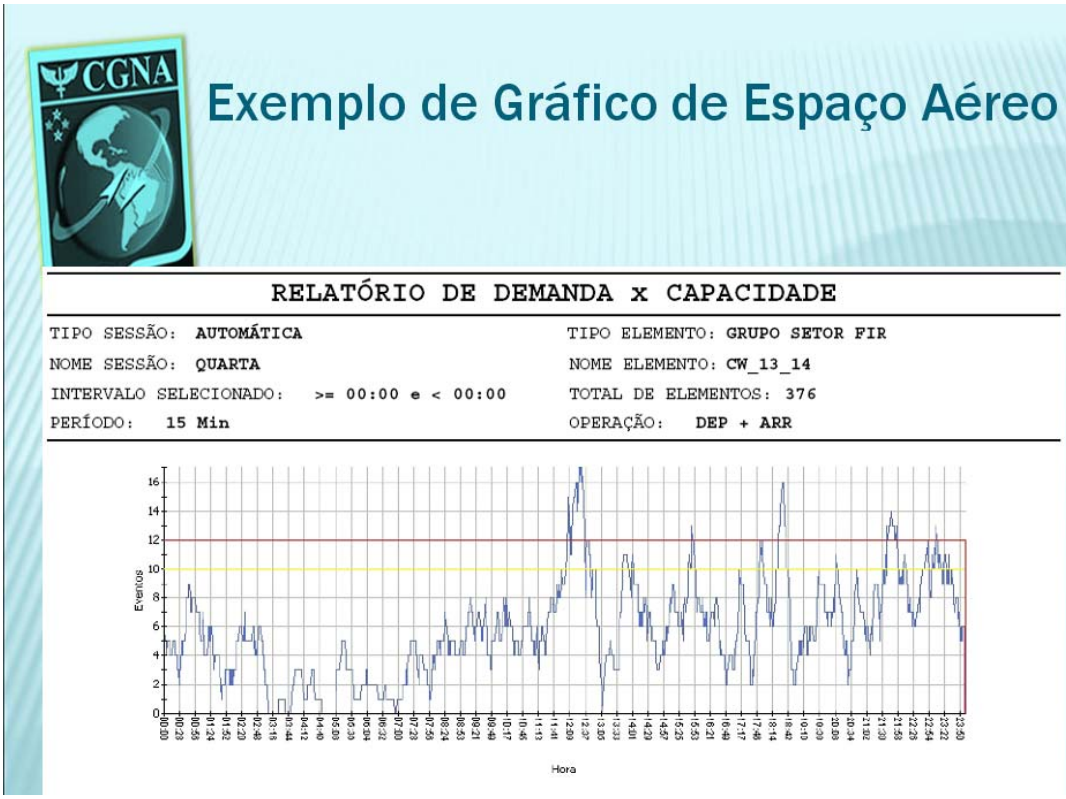
FLOW CHART ATFM ANALYSES



APPENDIX C

SCREEN SHOTS OF ATFM TOOLS IN USE IN THE CAR/SAM REGIONS

Synchromax
Brazil



PROSAT

Mexico

Traffic Flow Management System (TFMS)

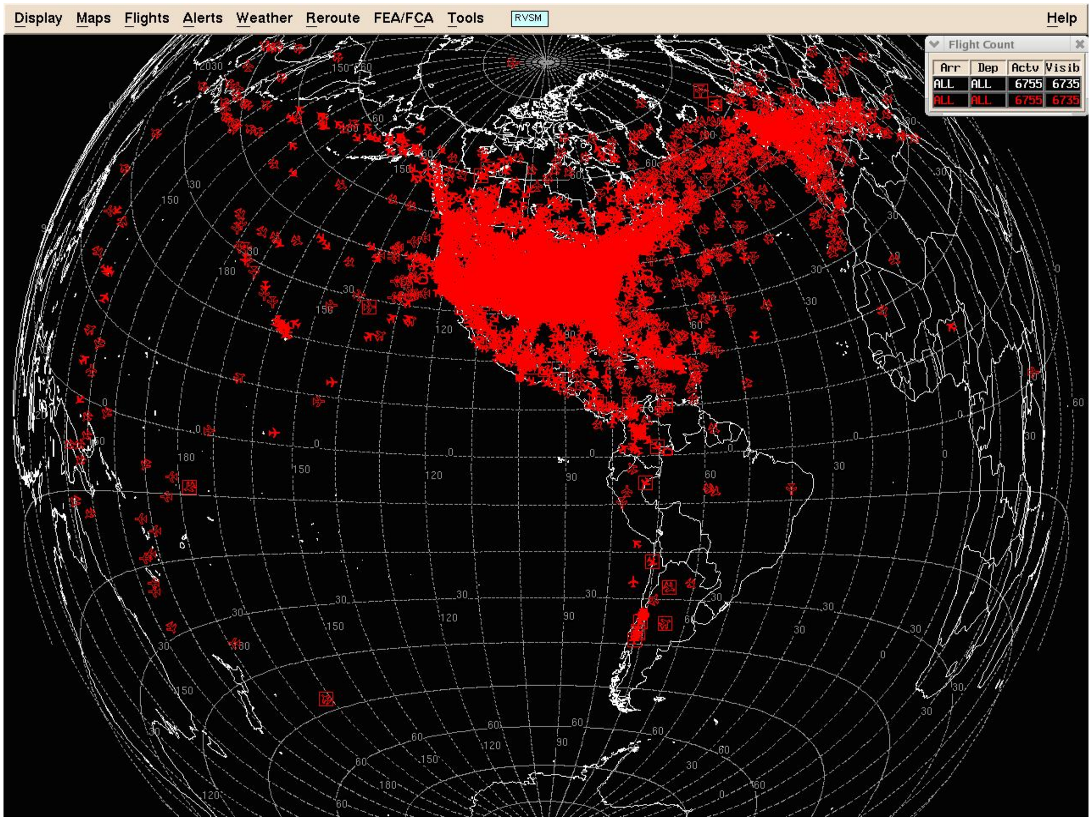
United States

Mexico

COCESNA

Colombia

Chile



APPENDIX D

INTERNATIONAL OPERATIONS PLANNING TELCON FORMAT

_____ Greeting and introduction
xxxxZ planning telcon, working from advisory xxx
Covering the timeframe from xxxx UTC to xxxx UTC

_____ Common Weather Products – working from
1) the ICAO Area "A" Prog Chart, valid xxxx UTC for (Date)
2) the ICAO Area "A" IR Satellite photo, xxxx UTC for (Date)

_____ Planning discussion **--** Work from south to north then from the Caribbean to the Pacific (east to west)

Significant weather and atmospheric conditions
Thunderstorm activity
Turbulence
Volcanic ash clouds

Terminal discussion
For select aerodromes:
Airport/Sector Capacities
Projected terminal demand
Aerodrome constraints, such as construction projects or NAVAID outages

Anticipated traffic management initiatives (TMIs)
Expanded miles-in-trail
Potential airborne holding
Potential ground stops

Enroute discussion
Enroute constraints, such as frequency outages or NAVAID outages
Route discussion and issues
Anticipated TMIs
Expanded miles-in-trail
Potential airborne holding

_____ Additions to the plan, including any pertinent tactical updates.

_____ Stakeholder input, comments, and questions

_____ Next International Planning Telcon: xxxxZ

APENDICE B/APPENDIX B

SAFETY ASSESSMENT POST-IMPLEMENTATION OF RVSM AT THE CARIBBEAN AND SOUTH AMERICAN AIRSPACE FOR THE YEAR 2008

This paper presents the results of the safety assessment in the operational phase of the implementation of a Reduced Vertical Separation Minimum of 300 m (1000 ft) in the airspace of the Caribbean and South American regions (CAR/SAM). This step is a continuation of the implementation strategy from the *"Manual on Implementation of a 300 m (1000 ft) Vertical Separation Minimum between FL 290 and FL 410 inclusive, ICAO, Montreal, Doc 9574, 2nd Edition 2002"*, (Reference 1). <u>It should be made to ensure that operations in the RVSM airspace have not induced an increase in collision risk and that the overall vertical risk does not exceeds the safety objectives established.</u>

Special attention will be required to ensure that:

1) All aircraft operating in the airspace where a reduced vertical separation minimum is applied, has its RVSM approval;

2) The RVSM approval process remains effective;

3) The TLS of 2.5 x 10-9 fatal accidents per aircraft flight hour (relating to technical height-keeping performance monitored from a representative sample of the aircraft population) continues to be satisfied according to a predetermined level of statistical confidence.

   If the Technical TLS is not satisfied in accordance with global system performance specification, verify if it is necessary and sufficient to consider a trade-off between the parameters of the Collision Risk Method used in monitoring;

4) The introduction of the RVSM does not increase the level of risk due to operational errors and in-flight contingency according to a predetermined level of statistical confidence;

5) Be effective the additional safety measures introduced to reduce de risk and satisfy the safety objectives due to operational errors and in-flight contingency;

6) There is evidence of stability of the altimetry system error (ASE); and

7) The Air Traffic Control procedures remain effective.

The methodological procedures used are based on the experience acquired with the implementation of RVSM as References 2 to 16. The main evaluation data, the main conclusions inferred and the recommendations are summarized below.

The Airspace

The airspace of the CAR/SAM regions consists of 34 Flight Information Regions (FIR) constituted by the following States: Antigua, Argentina, Barbados, Barbuda, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, Ecuador, French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Netherlands Antilles, Nevis, Nicaragua, Panama, Paraguay, Peru, St. Barthelemy, St. Kitts, St. Lucia, St. Vincent, Suriname, Trinidad & Tobago, Uruguay and Venezuela.

To facilitate the analysis, the airspace was evaluated by regions: a single region comprising the Caribbean and the South America (CAR/SAM), Caribbean Region (CAR), South America Region (SAM), Chile-Cuba Corridor, Amazonia-Port au Prince Corridor and Guayaquil-Piarco Corridor. Each part of the airspace was treated as an isolated system, in other words, with its own statistical parameters.

It was analyzed flight data of: 2346 report point, 3242 route segments, and, 38904 flight levels belonging to the route segments of 336 airways of 34 FIR.

Traffic Movement Data Collection

The sample used to estimate the passing frequency and the physical and dynamic parameters of the typical aircraft for the collision risk assessment, was collected during the period from 7 until 20 of march of 2009, in compliance with the determination of the conclusion of the sixth ATM/CNS/SG/6 meeting that took place at Santo Domingo, Dominican Republic, in the period from 30 of June until 4 of July of 2008.

From the 34 FIR of the CAR/SAM regions, were treated the data received from: eight FIR from the Caribbean region (Havana, Central America, Kingston, Panama, Curacao, Piarco, Santo Domingo and Port au Prince), and twenty four FIR from the South American region (Brasilia, Curitiba, Recife, Amazonica, Atlantico, Lima, Santiago, Punta Arenas, Antofagasta, Puerto Montt, Guayaquil, Bogota, Barranquilla, Maiquetia, Montevideo, Mendoza, Cordoba, Resistencia, Comodoro Rivadavia, Asuncion, Ezeiza, Georgetown, Paramaribo and Rochambeau). The number of flight hours for each FIR, region and corridor is presented on Tables 1 to 4. From the considered sampling, note in Table 1 the percentage contribution on the flight hours of each region: CAR (27.92%), SAM (72.08%). The **Chile-Cuba Corridor** has 33.40% of the total movement from the CAR/SAM regions and comprises the following FIR: Punta Arenas, Puerto Montt, Santiago, Antofagasta, Lima, Guayaquil, Panama, Central America, Kingston and Havana (see Table 2 below). The **Amazonia-Port au Prince Corridor** has 16% of the total movement from the CAR/SAM regions and comprises the following FIR: Amazonica, Maiquetia, Curacao, Santo Domingo and Port au Prince (see Table 3 below). The Guayaquil-Piarco Corridor has 12.07% of the total movement from the CAR/SAM regions and comprises the following FIR: Guayaquil, Bogota, Barranquilla, Maiquetia and Piarco (see Table 4 below).

Aircraft Population

According to the orientation guide for the RVSM implementation, is essential that 100% of the RVSM approved aircraft population satisfies the RVSM requirements. However, it was noted evidence of large amount of non-compliant aircraft flying at the RVSM airspace. Unfortunately, the Caribbean and South American Monitoring Agency (CARSAMMA) is not yet provided of an aircraft monitoring capability that proves such evidence. This activity is part of a technical performance monitoring program of aircrafts in flight that is not established at CAR/SAM regions yet. On Table 5 is shown the aircraft population which flew at CAR/SAM regions with its respective dimensions and flight hours percentage, including the one from a typical aircraft.

FIR	Flight Hours	%
HAVANA	4158.2167	7.97%
CENTRAL AMERICA	2751.8333	5.28%
PANAMA	2209.5051	4.24%
KINGSTON	1895.7476	3.63%
CURACAO	1464.8500	2.81%
PIARCO	1461.2825	2.80%
PORT AU PRINCE	337.9833	0.65%
SANTO DOMINGO	283.2833	0.54%
SUBTOTAL 1 (CAR Region)	**14562.7018**	**27.92%**
RECIFE and ATLANTICO	6160.3630	11.81%
BRASILIA	7620.2573	14.61%
AMAZONICA	4777.3873	9.16%
CURITIBA	5018.2574	9.62%
LIMA	2760.3659	5.29%

FIR	Flight Hours	%
SANTIAGO and ANTOFAGASTA	2342.3667	4.49%
BOGOTA	1553.8645	2.98%
GUAYAQUIL	1005.5333	1.93%
MAIQUETIA	1480.6306	2.84%
CORDOBA	842.6833	1.62%
BARRANQUILLA	793.2415	1.52%
COMODORO RIVADAVIA	467.4764	0.90%
RESISTENCIA	430.5277	0.83%
PUNTA ARENAS	120.9500	0.23%
ROCHAMBEAU	254.6333	0.49%
ASUNCION	331.7785	0.64%
GEORGETOWN	147.4167	0.28%
PUERTO MONTT	177.3333	0.34%
PARAMARIBO	132.1567	0.25%
MONTEVIDEO	465.7535	0.89%
EZEIZA	216.9833	0.42%
MENDOZA	503.8000	0.97%
SUBTOTAL 2 (SAM Region)	**37603.7602**	**72.08%**
TOTAL CAR/SAM Regions	**52166.4620**	**100.00%**

Table 1 – Total Number of Flight Hours of the FIR from the CAR/SAM Regions (14 days sample)

FIR	Flight Hours	%
HAVANA	4158.2167	7.97%
KINGSTON	1895.7476	3.63%
PANAMA	2209.5051	4.24%
CENTRAL AMERICA	2751.8333	5.28%
GUAYAQUIL	1005.5333	1.93%
LIMA	2760.3659	5.29%
SANTIAGO and ANTOFAGASTA	2342.3667	4.49%
PUERTO MONTT	177.3333	0.34%
PUNTA ARENAS	120.9500	0.23%
TOTAL	**17421.85**	**33.40%**

Table 2 – Total Number of Flight Hours of the FIR from the CHILE-CUBA Corridor

FIR	Flight Hours	%
AMAZONICA	4777.3873	9.16%
MAIQUETIA	1480.6306	2.84%
CURACAO	1464.8500	2.81%
SANTO DOMINGO	283.2833	0.54%
PORT AU PRINCE	337.9833	0.65%
TOTAL	**8344.1345**	**16.00%**

Table 3 – Total Number of Flight Hours of the FIR from the AMAZONIA-PORT AU PRINCE Corridor

FIR	Flight Hours	%
GUAYAQUIL	1005.5333	1.93%
BOGOTA	1553.8645	2.98%
BARRANQUILLA	793.2415	1.52%
MAIQUETIA	1480.6306	2.84%
PIARCO	1461.2825	2.80%
TOTAL	**6294.5524**	**12.07%**

Table 4 – Total Number of Flight Hours of the FIR from the GUAYAQUIL-PIARCO Corridor

Aircraft Type	Hours	% ACFT Pop	Length [NM]	Width [NM]	Height [NM]
A320	8082.111	15.49	0.0202860000	0.0184130000	0.0063500000
B763	6233.007	11.95	0.0296440000	0.0257020000	0.0075590000
B738	5594.638	10.72	0.0213280000	0.0185210000	0.0067490000
B737	4200.524	8.05	0.0188980000	0.0185210000	0.0067490000
A319	2671.061	5.12	0.0182720000	0.0184130000	0.0063500000
B752	2554.727	4.9	0.0255510000	0.0207880000	0.0073220000
A332	2322.531	4.45	0.0317490000	0.0325590000	0.0093950000
B772	2150.150	4.12	0.0343950000	0.0328830000	0.0099890000
E190	1325.567	2.54	0.0195680350	0.0155075590	0.0057073430
B733	1269.009	2.43	0.0172790000	0.0161990000	0.0064790000
B762	1122.983	2.15	0.0261880000	0.0257020000	0.0075590000
A343	1047.094	2.01	0.0343410000	0.0325590000	0.0090980000
B744	1018.447	1.95	0.0381750000	0.0347730000	0.0104750000
A318	669.5833	1.28	0.0169820000	0.0184130000	0.0067820000
B767	661.7353	1.27	0.0331530000	0.0280240000	0.0090710000
A346	651.6601	1.25	0.0406590000	0.0342600000	0.0093410000
B764	630.8894	1.21	0.0331530000	0.0280240000	0.0075590000
F100	609.7189	1.17	0.0191846700	0.0151619900	0.0045896300
A321	596.8016	1.14	0.0240330000	0.0184130000	0.0063500000
MD11	541.6333	1.04	0.0332613400	0.0280777500	0.0094654400
DC10	529.6030	1.02	0.0299946000	0.0255669500	0.0094654400
A306	515.3167	0.99	0.0292120000	0.0242120000	0.0089310000
MD80	512.9229	0.98	0.0243520500	0.0177375800	0.0051295900
B732	445.1000	0.85	0.0161990000	0.0156590000	0.0064790000
B735	349.2667	0.67	0.0167930000	0.0156050000	0.0059940000
A330	300.7499	0.58	0.0343412500	0.0325594000	0.0090874700
B773	287.3974	0.55	0.0399030000	0.0328830000	0.0099890000
B722	274.9975	0.53	0.0219220000	0.0177650000	0.0055620000
A340	242.0333	0.46	0.0406590000	0.0342600000	0.0093410000
B77W	206.7500	0.40	0.0343952480	0.0349892010	0.0100431970
A342	195.4782	0.37	0.0320680000	0.0325590000	0.0090170000
LJ35	191.6333	0.37	0.0080075590	0.0065010800	0.0020140390

Aircraft Type	Hours	% ACFT Pop	Length [NM]	Width [NM]	Height [NM]
CRJ9	185.3500	0.36	0.0195460000	0.0125810000	0.0040500000
B777	182.4000	0.35	0.0343952480	0.0349892010	0.0100431970
CL60	168.8333	0.32	0.0112580990	0.0105885530	0.0034017280
Others	-	6.96	-	-	-
Weighted Average			**0.02439009**	**0.02198885**	**0.007153745**
TOTAL	**52166.46**	**100.00**			

Table 5 – Aircrafts that flew at CAR/SAM regions between the FL 290 and FL 410 inclusive

Data about Technical Vertical Deviation

These data should be provided by a monitoring program of the aircraft height-keeping performance error. It has never been obtained for the CAR/SAM region because of a lack of appropriate capacitation established in States. The Scrutiny Working Group (SWG) that assists CARSAMMA at the Large Height Deviation (LHD) reports analysis, rarely have detected errors due to the altimetry system (ASE) and to the height-keeping performance system (AAD). In the assessments prior to 2009, CARSAMMA used ASE data provided by EUROCONTROL, but for the year of 2009, the data was not provided by any monitoring agency and, even it had been done, it would not serve to estimate the vertical collision probability, since the data of errors due to the height-keeping performance system (AAD) were not provided either. The lack of these data incapacitates CARSAMMA to opine or even try to give any explanation about the history of the behavior of the technical performance of any aircraft flying in the CAR/SAM regions airspace.

Demonstration of the Technical Viability of the RVSM Application in the CAR/SAM Regions

Basically it is the assessment of the results from the monitoring of the values of the parameters of the collision risk model from Reich, passing frequency (N_x), vertical superposing probability ($P(S_z)$) and the lateral superposing probability ($P_y(0)$), to prove if the following targets were attained:

a) Provide confidence on the technical TLS satisfaction;

b) Provide guidance on the efficacy of the MASPS RVSM and the effectiveness of modifications on the altimetry system; and

c) Provide evidence on ASE stability.

Conditions which Quantify the Global System Performance Specification

Passing Frequency, N_x – is the parameter of the airspace which characterizes the aircraft exposure to vertical collision risk. The estimative to the equivalent passing frequency was made considering aircrafts flying on same direction and on opposite directions. The passing frequency was individually determined for each route segment, airway, FIR and corridor within the CAR/SAM regions airspace, at a total of 3242 route segments belonging to 336 airways from 34 FIR.

At Table 6 are shown the thirty route segments which presented the highest peaks of equivalent passing frequency, on decreasing order, together with its respective number of flight hours presented at Table 6.1. The flight hours per flight level are presented at Figure 1 to 11 for the main route segments, airways and FIR considered important for argumentation and evidences. The values are related to CAR/SAM airspace system which is represented by the 34 FIR considered. The passing frequency peaks indicate the places with greater collision risk potential. Following some observations:

<u>Route segments</u>: main discrepancies of flight distribution per level

- The highest peak of passing frequency which represents the highest exposure to the vertical collision risk is at the route segment DOBKO-SAGAZ at airway UW58 in the Brasilia FIR occupying the second place on the total number of flight hours (385 h), see Figure 1.0;
- The section URSUS-UCA at airway UA301 in the Havana FIR is the one that presents the highest number of flight hours (538 h), despite, it presents the second highest passing frequency, second highest exposure to the vertical collision risk, see Figure 2.0;
- The section GONZA-LIBRA at airway UW58 in the Recife FIR presents the third highest passing frequency and the seventh place on the total number of flight hours (280 h), see Figure 1.1;
- The section UCL-UVA at airway UG448 in the Havana FIR presents the fourth place on the passing frequency and on the total number of flight hours (334 h), see Figure 3.0;
- The section LIBRA-SAGAZ at airway UW58 in the Recife FIR presents the fifth highest passing frequency and the fortieth place on the total number of flight hours (128 h), see Figure 1.2;
- The section CONDE-SVD at airway UW58 in the Brasilia FIR presents the 26th highest passing frequency and the 145th place on the total number of flight hours (70 h), see Figure 1.3;
- The section TTZ3-BGI at route TTZP3 in the Piarco FIR presents the 47th highest passing frequency and the third place on the total number of flight hours (356 h). Presents the best distribution of flights per level and best explores the sub-utilization of the airspace at the safety point of view, see Figure 4.0;

Conclusion: in terms of exposure to the vertical collision risk, distributions of flights per level of several route segments are not presented according to a logic optimization.

<u>Route/Airways</u>: main discrepancies presented between the distributions of flights per level

- The airway UW58 presents the highest exposure to the vertical collision risk (highest passing frequency) with least flight hours (2206 h) than the airway UL780 (2281 h). Sections sub-utilized and with flights poorly distributed between the levels in terms of exposure to the vertical collision risk, see Figure 1.4;
- The airway UG448 presents the second highest exposure to the vertical collision risk and the ninth place on the total number of flight hours (885 h). Presents poor distribution of flights per level, principally from the FL 340, see Figure 3.1;
- The airway UA301 presents the fourth highest exposure to the vertical collision risk and also the fourth place on the total number of flight hours (1186 h). This airway presents flight distribution per level relatively better than the UG448 and UW58, but still leaves much to be desired, see Figure 2.1;
- The route TTZP3 presents the 35th highest exposure to the vertical collision risk and the 40th place on the total number of flight hours. Presents the best flight distribution per level and exploits better the sub-utilization of the airspace, see Figure 4.1.

Conclusion: in terms of exposure to the vertical collision risk, distributions of flights per level of several routes/airways are not presented according to a logic optimization.

FIR

- The Havana FIR (Figure 5) presents higher exposure to the vertical collision risk than the Brasilia FIR (Figure 7) which has a lot more flight hours, see Figure 5;
- The Curitiba FIR presents the 14th highest exposure to the vertical collision risk and is the second place on the total number of flight hours (see Figure 10). The passing frequency is ten times lesser than the one from Havana FIR, which has less flight hours;
- The Kingston, Havana and Port au Prince FIR presents approximately the same vertical collision risk exposure, relative to their air traffic flow;
- Taking the Curitiba FIR as reference, all FIR can significantly improve the aircraft exposure to the vertical collision risk by redistributing de flights per level, including Ezeiza FIR which presents the less passing frequency and is the 29th place on the total number of flights hours among the 34 FIR, see Figure 11;
- It is observed that, in general, the flights distributions per level follow the fuel economy at almost every FIR. The parameter that represents the aircraft exposure to the vertical collision risk is ignored.

Conclusion: use of airspace is not optimized in terms of aviation safety. The CAR/SAM regions airspace clamors for an optimization of the flight levels occupancy taking into account the parameter that represents the exposure of aircraft to the vertical collision risk (equivalent passing frequency).

Route segments		Airway	Equivalent Passing Frequency	Total Number of Flight Hours	FIR
Fix A	Fix B		Monitoring Phase IV		
DOBKO	SAGAZ	UW58	0.0167063	384.98904	SBBS/SBRE
URSUS	UCA	UA301	0.0111262	537.56382	KZMA/MUFH
GONZA	LIBRA	UW58	0.0092401	280.30887	SBRE
UCL	UVA	UG448	0.0074080	333.54779	MUFH
LIBRA	SAGAZ	UW58	0.0053614	128.29165	SBRE
UVA	TADPO	UG448	0.0052551	239.21706	KZMA/MUFH
CROOK	DOBKO	UW58	0.0052305	122.45154	SBBS
NISTI	CROOK	UW58	0.0050404	117.73992	SBBS
JUDAS	GONZA	UW58	0.0038481	183.86589	SBRE
ATUVI	UCL	UG448	0.0036059	226.83455	MUFH/MKJK
SIA	BEREX	UG430	0.0033555	199.31458	MKJK
SEKMA	ARNAL	UL465	0.0027128	288.05574	MKJK/MPZL
DEPOT	NISTI	UW58	0.0025839	64.60128	SBBS
UCA	PUTUL	UG430	0.0023467	315.67659	MUFH/MKJK
ALOBO	EMASA	UL465	0.0023283	201.16596	MKJK
PUTUL	SIA	UG430	0.0023055	136.17975	MKJK
ACJ	NICAR	UW58	0.0022353	114.69384	SBRE
UGUPI	GYV	UL780	0.0022184	211.45379	SKED/SEGU
BUXOS	UGUPI	UL780	0.0022144	211.11667	MPZL/SKED
BEREX	KILER	UG430	0.0021035	124.94347	MKJK
GAXER	DAGUD	UL780	0.0019081	267.03333	MUFH/MKJK
CANOA	VINKA	UB646	0.0018112	191.19086	KZMA/MUFH
VAKUD	TRU	UL780	0.0016524	192.35626	SEGU/SPIM
POTRO	ORAGO	UW58	0.0015263	162.57015	SBBR
UCA	GONIS	UG437	0.0014228	154.91730	MUFH

Route segments		Airway	Equivalent Passing Frequency Monitoring Phase IV	Total Number of Flight Hours	FIR
Fix A	Fix B				
CONDE	SVD	UW58	0.0013512	70.37624	SBBR
UCL	SELEK	UG439	0.0012960	129.55711	MUFH
MARMA	DAGUD	UL780	0.0012871	198.09133	MKJK/MPZL
ELASA	ATEDA	UL302	0.0012611	157.99362	SCFZ
PIGBO	URSUS	UL780	0.0012523	141.54583	KZMA/MUFH

*of a total of 3342 route segments

Table 6 – Route segments which present the Highest Values of Passing Frequency Peaks (decreasing order)

Order	Fix A	Fix B	Airway	Flight Hours
1	URSUS	UCA	UA301	537.5638
2	DOBKO	SAGAZ	UW58	384.9890
3	TTZ3	BGI	TTZP3	356.1572
4	UCL	UVA	UG448	333.5478
5	UCA	PUTUL	UG430	315.6766
6	SEKMA	ARNAL	UL465	288.0557
7	GONZA	LIBRA	UW58	280.3089
8	GAXER	DAGUD	UL780	267.0333
9	UVA	TADPO	UG448	239.2171
10	ATUVI	UCL	UG448	226.8345
11	SAISOOO1	ENTSOOO1	SOOO1	220.0000
12	LOGON	VUMPI	UL795	217.9917
13	URSUS	GELOG	UL795	212.5667
14	MOXES	TRU	UL780	212.4374
15	TEXAS	KOLVI	UW13	211.6883
16	UGUPI	GYV	UL780	211.4538
17	BUXOS	UGUPI	UL780	211.1167
18	ESIPO	DIBOK	UL795	201.8667
19	ALOBO	EMASA	UL465	201.1660
20	SIA	BEREX	UG430	199.3146
21	MARMA	DAGUD	UL780	198.0913
22	VAKUD	TRU	UL780	192.3563
23	CANOA	VINKA	UB646	191.1909
24	JUDAS	GONZA	UW58	183.8659
25	CURSE	PNG	UM788	179.9017
26	SILEN	SELMO	UT106	169.1084
27	CRV	UTRUN	UA570	169.0321
28	OPRAM	PCL	UW2	163.6394
29	POTRO	ORAGO	UW58	162.5702
30	PPR	TTZ1	TTZP1	161.0661
31	ELASA	ATEDA	UL302	157.9936
32	UCA	GONIS	UG437	154.9173
33	FOF	TTZ2	TTZP2	153.1332
34	NANDU	PONCA	UM540	153.0549
35	OTAMO	MLY	UA301	149.5211
36	MAXIM	ANALI	UG765	149.4631
37	PIGBO	URSUS	UL780	141.5458
38	SORTA	MOXES	UL780	140.8885
39	LOMID	MLO	UA308	138.4095

Order	Fix A	Fix B	Airway	Flight Hours
40	PUTUL	SIA	UG430	136.1797
41	ANALI	NUKAN	UG765	135.9869
42	VERME	ARX	UW2	134.4327
43	ENAMO	UNV	UB503	134.4281
44	BONOS	SELEK	UZ403	130.3994
45	VTN	TOY	UW200	129.8499
46	UCL	SELEK	UG439	129.5571
47	LIBRA	SAGAZ	UW58	128.2917
... 145	... CONDE	... SVD	... UW58	… 70.3800

Table 7 – Route segments with the higher numbers of Flight Hours (decreasing order)

Order	Route/Airway	Passing Frequency			Total Number of Flight Hours
		Same Direction	Opposite Direction	Equivalent	
1	UW58	1.9981991E-05	5.6887291E-02	5.6916422E-02	2206.1287
2	UG448	1.0458330E-04	1.7237362E-02	1.7383506E-02	884.9922
3	UL780	8.6620500E-07	1.5731689E-02	1.5733553E-02	2281.7406
4	UA301	1.5735705E-05	1.2902254E-02	1.2937732E-02	1185.9546
5	UG430	0.0000000E+00	1.0111925E-02	1.0111925E-02	790.5494
6	UA315	1.0882798E-04	7.6315452E-03	7.8234065E-03	935.9802
7	UL465	2.2482880E-06	7.1468525E-03	7.1502543E-03	703.8669
8	UL302	0.0000000E+00	4.9953927E-03	4.9953927E-03	650.1727
9	UL795	1.3772272E-05	4.9503613E-03	4.9844569E-03	1465.5798
10	UL417	1.3676240E-06	4.8576818E-03	4.8601358E-03	1057.4627
11	UG437	1.4919350E-06	4.6098445E-03	4.6122890E-03	919.3785
12	UW6	2.3381350E-06	4.4283690E-03	4.4320168E-03	663.5117
13	UL550	8.9529000E-08	4.3169062E-03	4.3170820E-03	682.1180
14	UW10	6.7816000E-07	3.3739286E-03	3.3751041E-03	761.8260
15	UA317	3.0001151E-05	2.8502366E-03	2.8980907E-03	1068.8157
16	UA321	3.1100660E-06	2.5077411E-03	2.5134438E-03	674.1832
17	UB646	2.7455000E-08	2.0945350E-03	2.0946825E-03	242.3111
18	UG436	9.6277740E-06	2.0036711E-03	2.0234227E-03	553.7458
19	UA314	4.4809920E-06	1.9009501E-03	1.9075820E-03	743.7516
20	UN873	1.5237780E-06	1.6846434E-03	1.6872046E-03	617.9944
21	UA570	1.7754260E-06	1.5874348E-03	1.5895109E-03	261.3000
22	UB503	3.3427300E-05	1.5034314E-03	1.5549561E-03	304.5188
23	UG426	1.9960050E-06	1.5208468E-03	1.5241619E-03	420.3790
24	UW33	4.0526300E-07	1.5189223E-03	1.5199042E-03	422.7782
25	UG439	4.2706890E-06	1.4444245E-03	1.4529779E-03	406.6445
26	UA550	4.3216528E-05	1.3619056E-03	1.4279765E-03	593.7716
27	UG765	2.4827000E-08	1.2476501E-03	1.2476838E-03	330.7500
28	UA319	5.6339020E-06	1.1008938E-03	1.1149716E-03	302.7991
29	UW43	1.3180000E-08	1.1073357E-03	1.1073619E-03	286.4667
30	UZ17	0.0000000E+00	1.0561228E-03	1.0561228E-03	227.0406
… 35	… ZZTP3	… 9.1E-09	… 0.000801	… 0.000802	… 356.1572

Table 8 – Higher values of Passing Frequency of the main routes/airways from the CAR/SAM regions (decreasing order)

FIR	Passing Frequency			Total Number of Flight Hours
	Same Direction	Opposite Direction	Equivalent	
HAVANA	4.0822537E-02	1.6752776E-04	4.0566065E-02	4158.2167
RECIFE & ATLANTICO	3.7289010E-02	5.6262304E-05	3.7161050E-02	6160.3630
BRASILIA	3.3815127E-02	4.5565196E-04	3.3175254E-02	7620.2573
KINGSTON	1.7635542E-02	1.2531200E-07	1.7635325E-02	1895.7476
PANAMA	1.1599855E-02	4.9655640E-06	1.1592147E-02	2209.5051
LIMA	1.0254301E-02	1.2951490E-06	1.0252036E-02	2760.3659
AMAZONICA	8.9551205E-03	1.2112493E-05	8.9323741E-03	4777.3873
SANTIAGO & ANTOFAGASTA	6.5380794E-03	5.9147150E-06	6.5295335E-03	2342.3667
BOGOTA	6.1312784E-03	4.6239240E-06	6.1238364E-03	1553.8645
CURACAO	4.9828185E-03	1.8745720E-04	4.6323221E-03	1464.8500
GUAYAQUIL	4.9351135E-03	2.1831570E-06	4.9315964E-03	1005.5333
MAIQUETIA	4.5978213E-03	4.5475794E-05	4.5285547E-03	1480.6306
CENTRAL AMERICA	4.0994002E-03	4.9317929E-05	4.0055658E-03	2751.8333
CURITIBA	3.2253377E-03	1.8629886E-04	2.9475596E-03	5018.2574
PORT AU PRINCE	3.1211355E-03	2.3539200E-06	3.1179159E-03	337.9833
CORDOBA	3.0689214E-03	2.8895820E-06	3.0646975E-03	842.6833
BARRANQUILLA	3.0394154E-03	6.4525700E-07	3.0383433E-03	793.2415
PIARCO	2.7025108E-03	1.8525300E-07	2.7000588E-03	1461.2825
SANTO DOMINGO	2.1484771E-03	3.2254000E-08	2.1484308E-03	283.2833
COMODORO RIVADAVIA	1.6207000E-03	2.6371430E-06	1.6164093E-03	467.4764
RESISTENCIA	1.6000265E-03	8.3573900E-07	1.5988212E-03	430.5277
PUNTA ARENAS	6.8660723E-04	8.8317300E-07	6.8520731E-04	120.9500
ROCHAMBEAU	4.9492547E-04	0.0000000E+00	4.9492547E-04	254.6333
ASUNCION	4.5115863E-04	4.8480580E-06	4.4524053E-04	331.7785
GEORGETOWN	3.7324407E-04	2.1155600E-07	3.7296277E-04	147.4167
PUERTO MONTT	2.8693251E-04	0.0000000E+00	2.8693251E-04	177.3333
PARAMARIBO	2.2651312E-04	8.8274000E-08	2.2627749E-04	132.1567
MONTEVIDEO	1.0882308E-04	5.5611657E-05	6.0862440E-06	465.7535
EZEIZA	5.4318641E-05	7.3971000E-08	5.3862309E-05	216.9833
MENDOZA	4.4470147E-05	8.2109670E-06	2.4405346E-05	503.8000
TOTAL (CAR/SAM Region)	**0.001259**	**0.001259**	**0.21491**	**52166.462**

Table 9 –Passing Frequency of the FIR from the CAR/SAM regions (decreasing order)

Following are presented some figures that show the number of flight hours per flight levels of the route segments, routes and FIR.

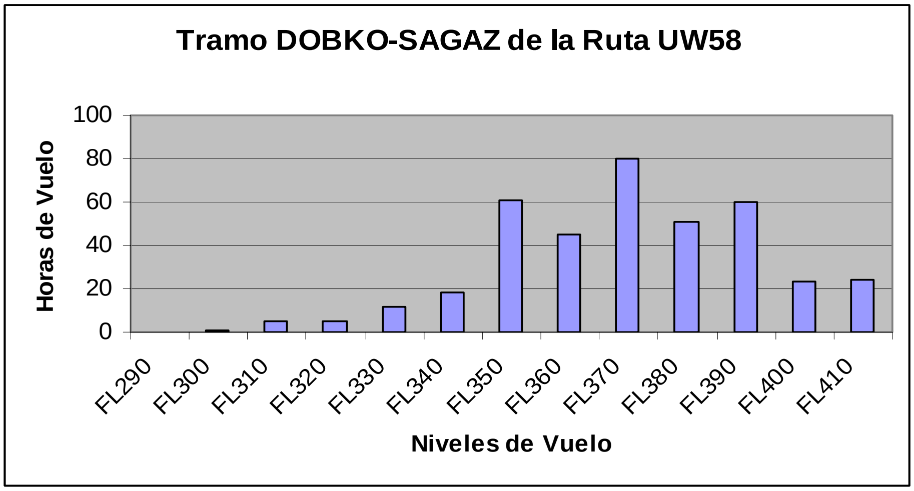


Figure 1.0 – Flight Hours per Flight Levels at route segment DOBKO-SAGAZ

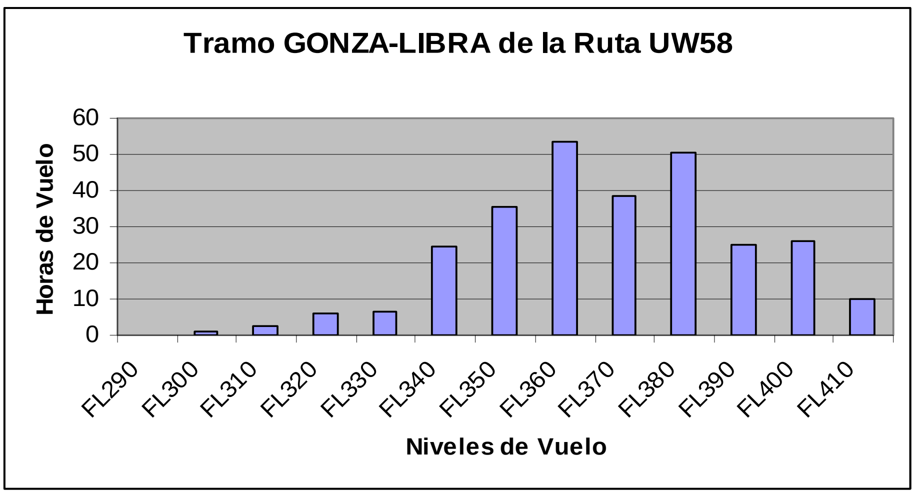


Figure 1.1 – Flight Hours per Flight Levels at route segment GONZA-LIBRA

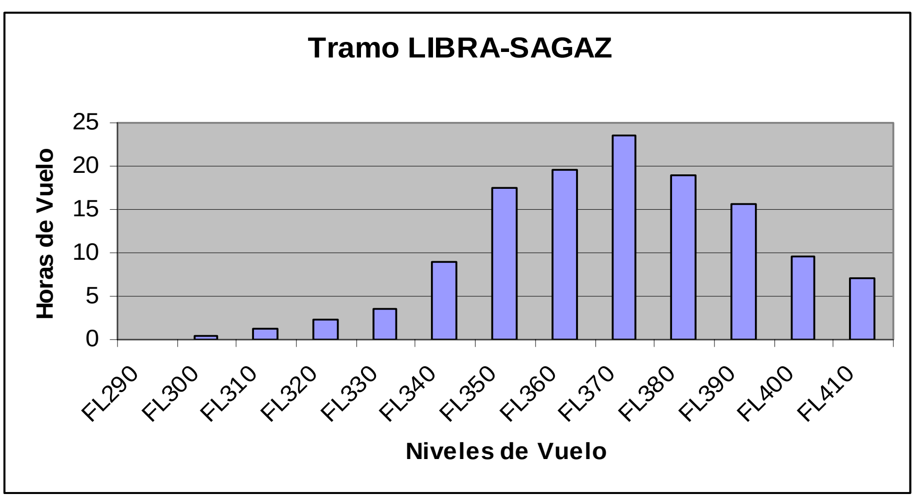


Figure 1.2 – Flight Hours per Flight Levels at route segment LIBRA-SAGAZ in airway UW58

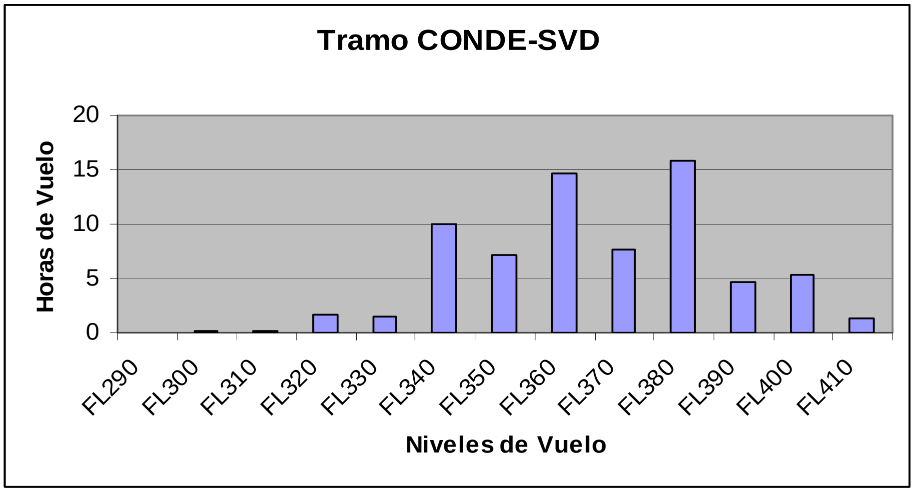


Figure 1.3 – Flight Hours per Flight Levels at route segment CONDE-SVD in airway UW58

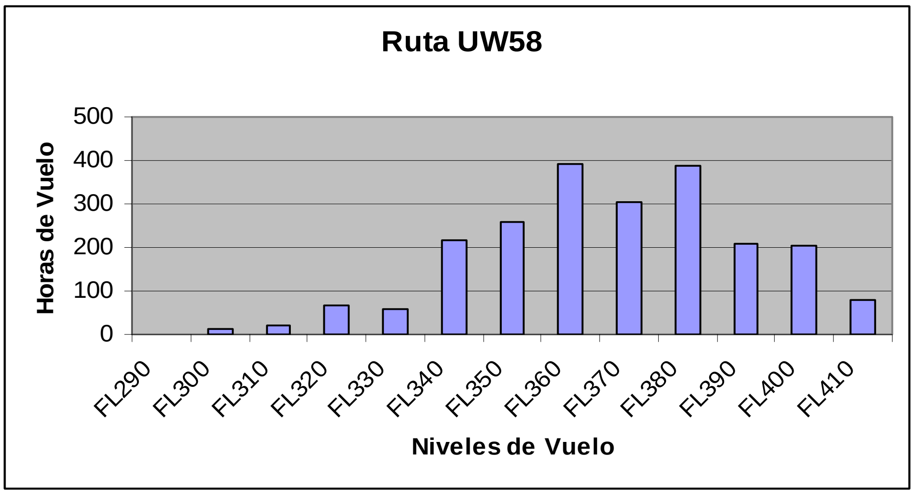


Figure 1.4 – Flight Hours per Flight Levels at airway UW58

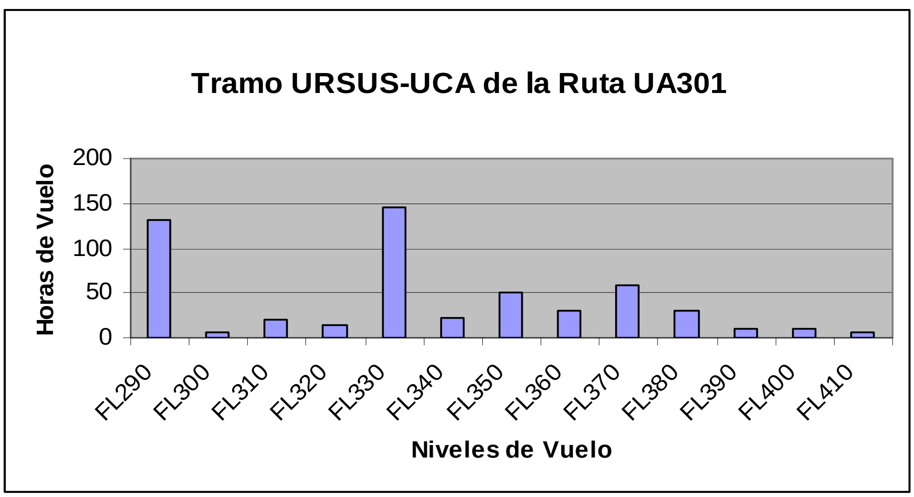


Figure 2.0 – Flight Hours per Flight Levels at route segment URSUS-UCA

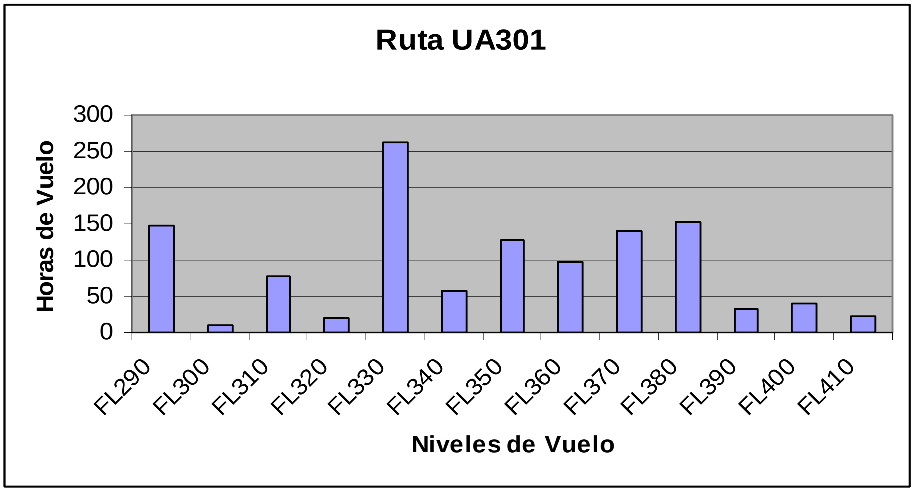


Figure 2.1 – Flight Hours per Flight Levels at airway UA301

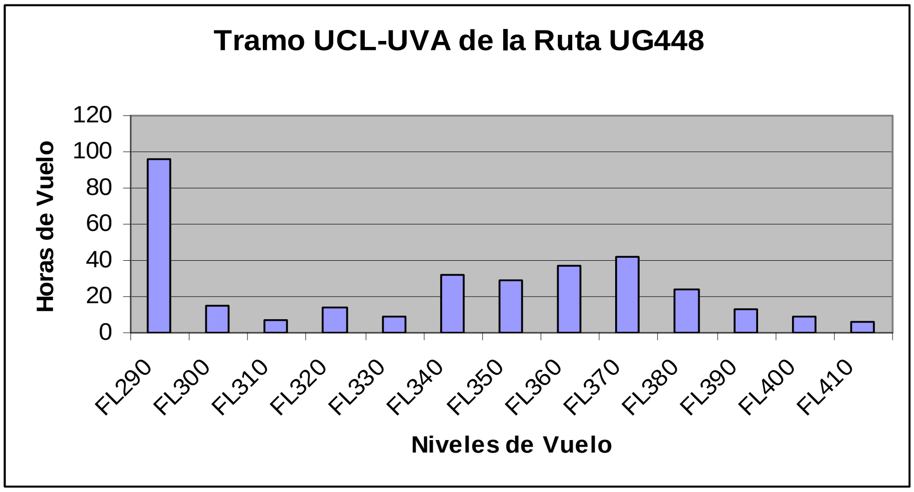


Figure 3.0 – Flight Hours per Flight Levels at route segment UCL-UVA

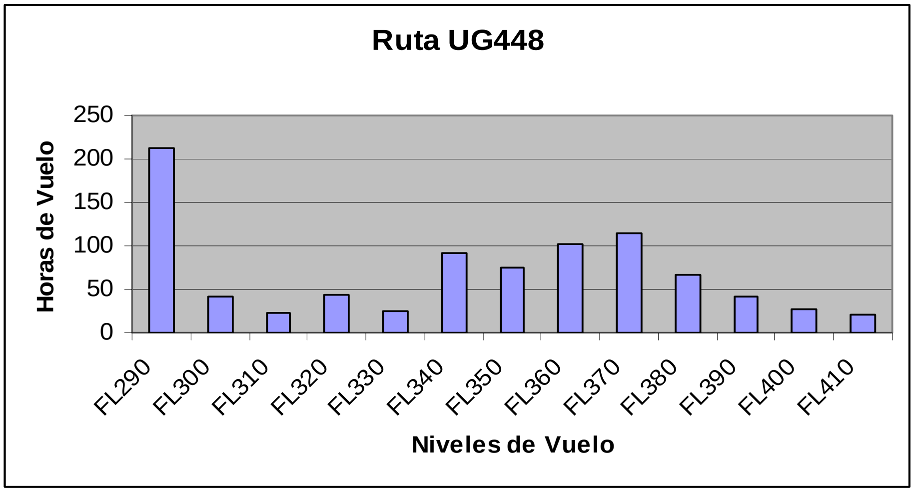


Figure 3.1 – Flight Hours per Flight Levels at airway UG448

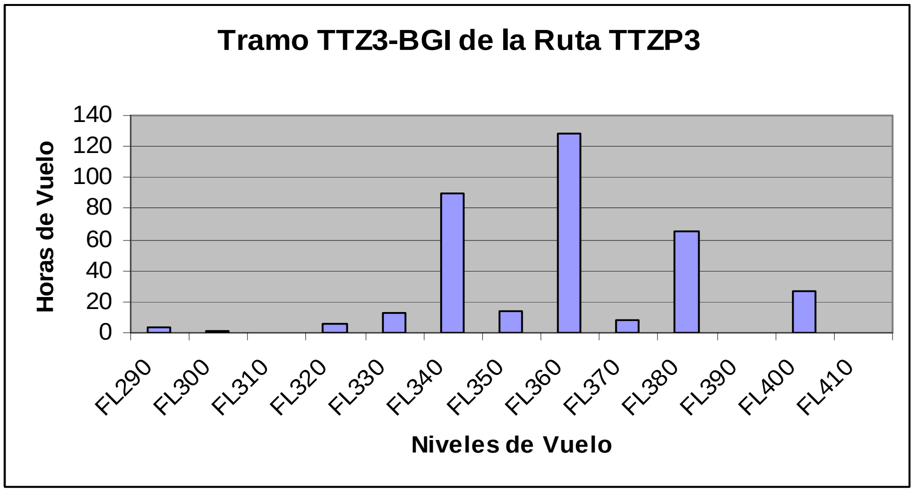


Figure 4.0 – Flight Hours per Flight Levels at route segment TTZ3-BGI

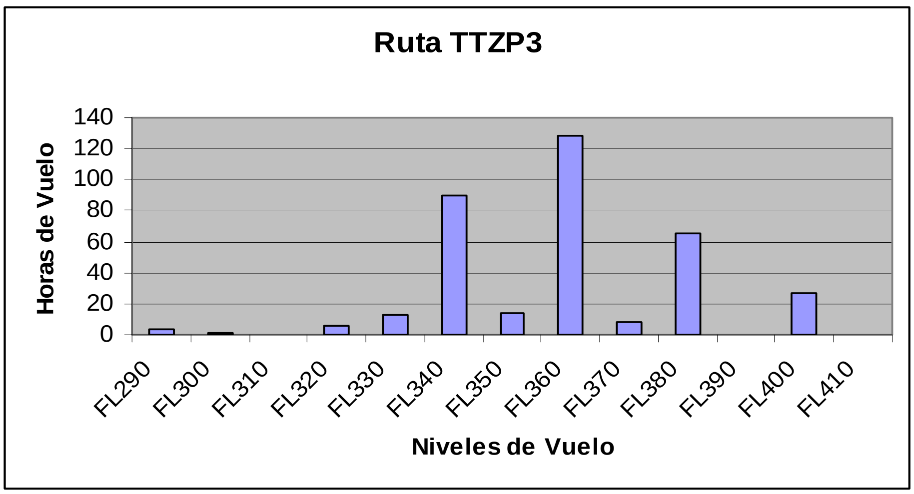


Figure 4.1 – Flight Hours per Flight Levels at route TTZP3

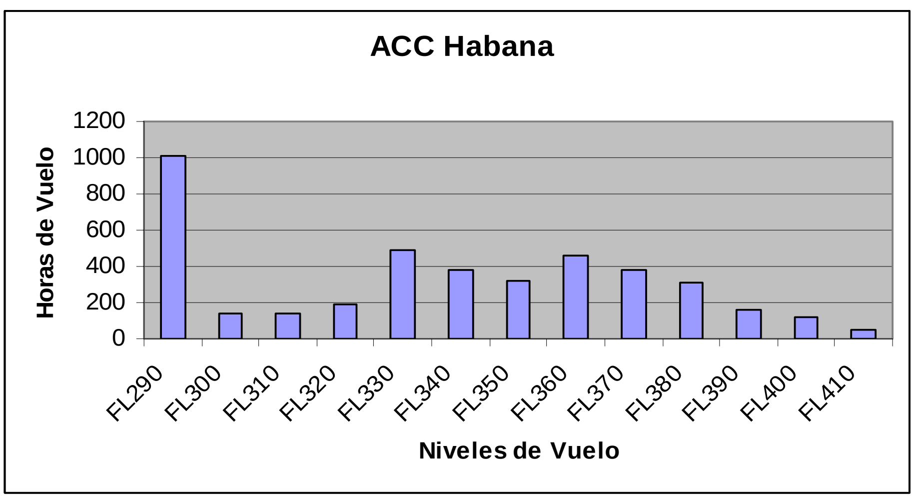


Figure 5.0 – Flight Hours per Flight Levels at Havana FIR

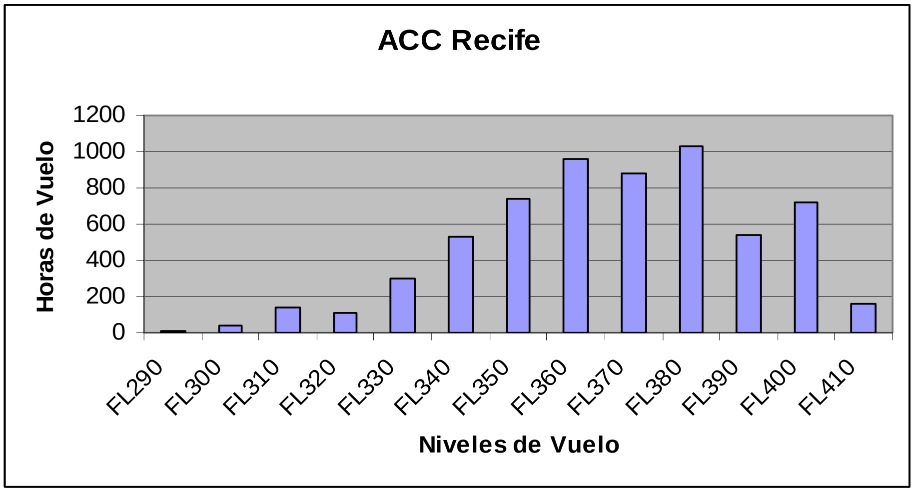


Figure 6 – Flight Hours per Flight Levels at Recife FIR

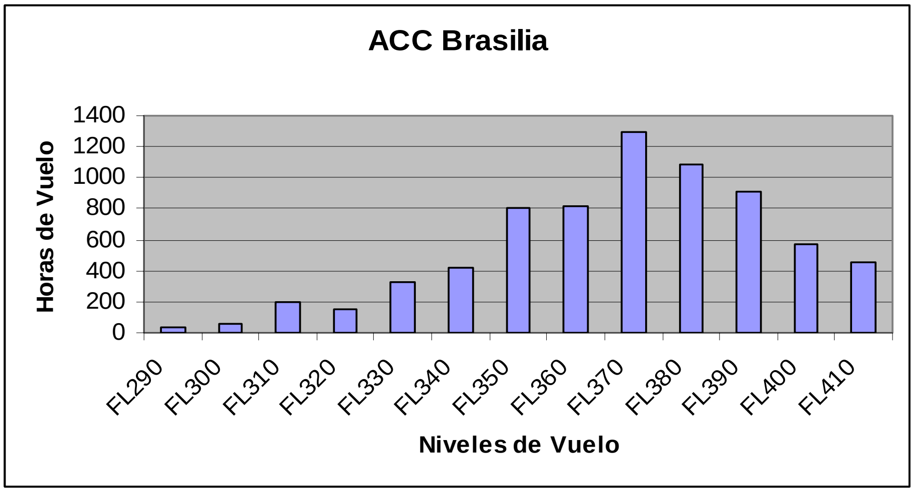


Figure 7 – Flight Hours per Flight Levels at Brasilia FIR

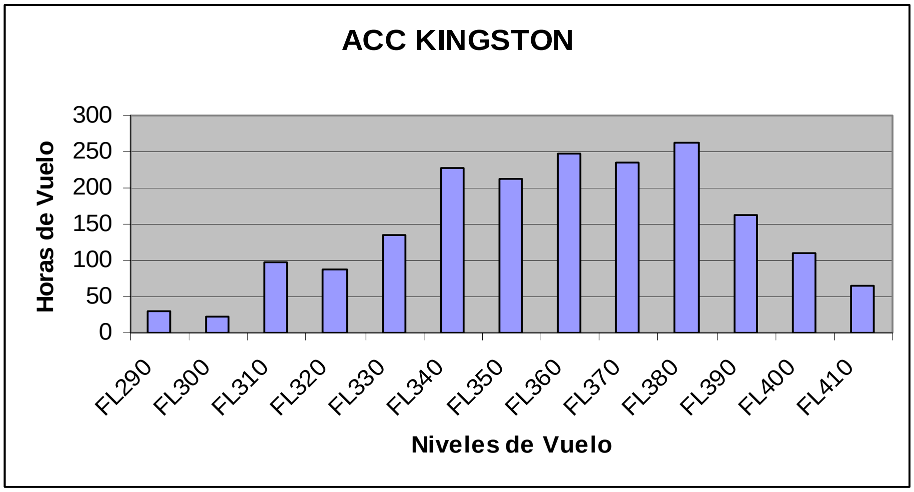


Figure 8 – Flight Hours per Flight Levels at Kingston FIR

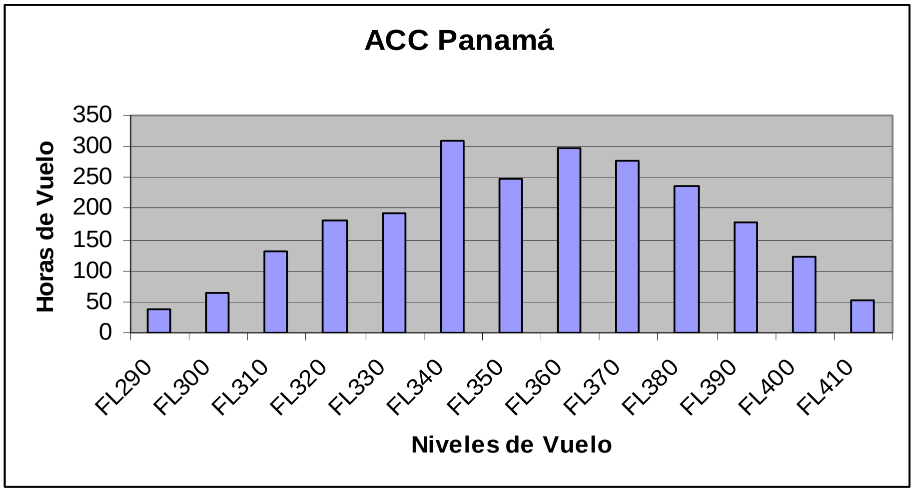


Figure 9 – Flight Hours per Flight Levels at Panama FIR

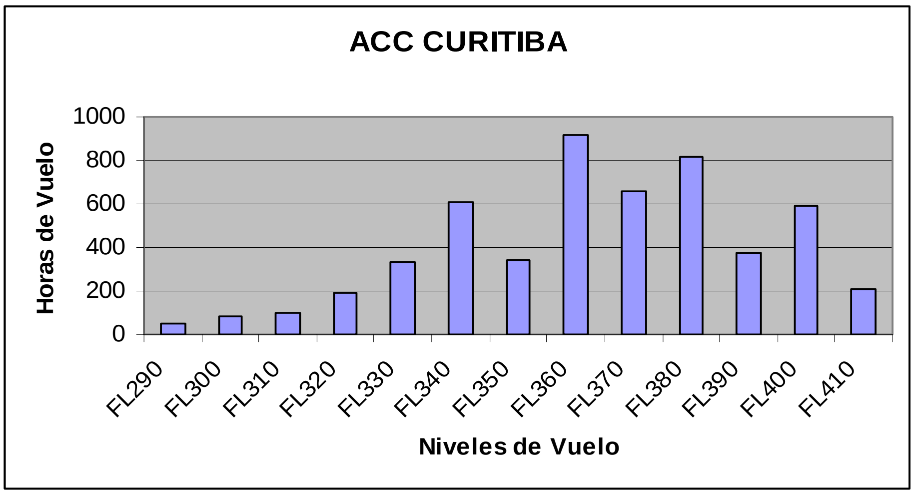


Figure 10 – Flight Hours per Flight Levels at Curitiba FIR

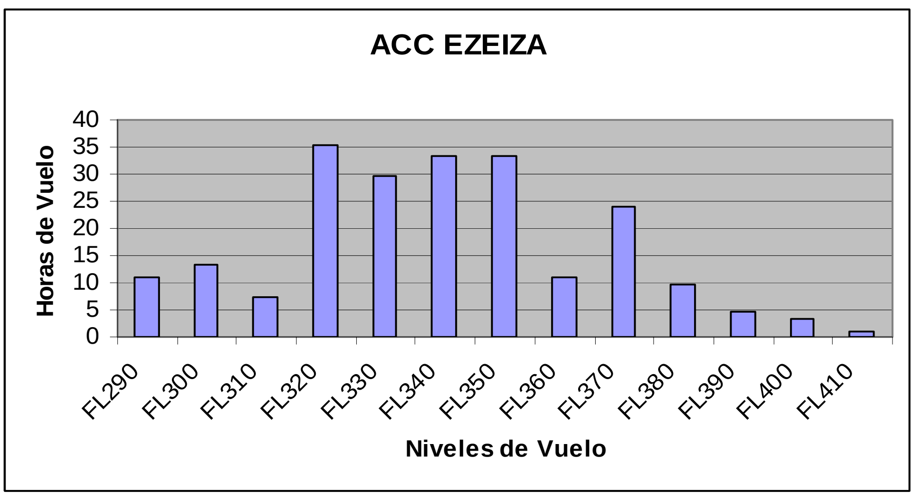


Figure 11 – Flight Hours per Flight Levels at Ezeiza FIR

Lateral Superposing Probability ($P_y\left(0\right)$)

It was not possible to monitor this parameter. According to ICAO Document 9574, the lateral superposing probability should be periodically assessed. However, the agency cannot perform the monitoring because it does not have the necessary infrastructure to do so. This parameter measures the aircraft performance on maintaining the bearing.

In order to make the operational collision risk assessment, it was considered that $P_y\left(0\right)$ does not exceed the value of 0.058, in accordance to ICAO recommendation (Ref. 1).

Vertical Superposing Probability ($P_z\left(1000\right)$)

It was not possible to monitor this parameter. CARSAMMA also cannot perform the monitoring of the vertical deviation (TVE) because it is not capable of for not having the necessary infrastructure to do so, as consequence, it was not possible to obtain the result of the vertical superposing probability at the CAR/SAM regions airspace.

The estimate value for $P_z\left(1000\right)$ should not exceed $1,7\times10^{-8}$, in accordance to ICAO recommendation (Ref. 1).

<u>Verification of the Global Height-keeping Performance Specification</u>

It was not possible to verify. The estimation of the four TVE proportions could not be realized because it was not possible to obtain the TVE distribution function due to the inexistence of a vertical errors monitoring program.

<u>Verification of the MASPS criteria</u>

For the same reasons, **it was not possible to verify** that:

- The mean of the Altimetry System Error (ASE) of the group does not exceed ±25 m (±80 ft);
- The sum of the absolute value of the ASE mean for the group and three standard deviation of the ASE distribution in the group does not exceed 75 m (245 ft); and
- The height-keeping errors are symmetric in respect of the mean of 0 m (0 ft); the standard deviation is not greater than 13 m (43,7 ft); and the error frequency decreases with the increase of the error magnitude at a exponential rate.

<u>Provide evidence of the ASE stability</u>

Because of the lack of a monitoring program establishment, CARSAMMA does not have a monitoring database of the aircrafts in the CAR/SAM regions. As consequence, it does not have previous monitoring database for the effect of an assessment of the history of the technical performance behavior. In summary, CARSAMMA is not yet capable of verifying the continued airworthiness and, consequently, to take knowledge and interact with the operators if the applications of aircraft maintenance procedures are being executed in conformance with the flight safety rules.

Identification of the Causes of the Inconsistency of the Height-keeping Errors

It was not possible to identify any causes because it was not possible to identify the vertical technical errors. A monitoring program of the Altimetry System Errors (ASE) would allow CARSAMMA to identify the following possible most common causes (identified during the monitoring executed by EUROCONTROL):

- Dirty or defective Pitot tubes;
- Static system defective;
- Defective Air Data Computer (ADC);
- Inadequate calibration of the Pitot-static system;
- Defective transponder;
- Defective static probe;
- Defective static system drain;
- Erosion or damage at the static probes;
- Deficient calibration of the static system;
- Eventual incorrect connections of the electric wires after maintenance;
- Problems at the fan attack angle;
- Corrosion at static port bearings;
- Static system leak;
- Static port inadequate wash;
- System pressure leak;
- Pitot head contamination;
- STBY identification system failure;
- Aircraft sold and disqualified for RVSM flights;
- Abrupt variation of the Meteorological conditions; and
- Etc.

According to what was presented at the fourth RMA Special Meeting in Canberra, Australia (Ref. 16), the HMU systems provide on regular operation, to the EUROCONTROL assessments, about 20000 monitoring results monthly. From these, approximately 250 results are submitted to an intense control, and, monthly, the Scrutiny Working Group of the Monitoring Agency finds and reviews about 50 aircraft which presents deviation from the validated data of more or less than 180 feet. Usually, from 2 to 3 aircrafts require investigations to take place.

Technical TLS Verification

The Technical TLS could not be verified. In order to verify the Technical TLS, is required that all necessary activities to demonstrate the safety objectives have proved the corresponding evidences that they have been based on. The presentation of the evidences related to the parameters of the vertical superposing probability ($P_z(S_z)$) and lateral superposing probability ($P_z(0)$) will only be possible after the establishment of the monitoring program of the vertical and lateral deviations.

<u>Assessment of the RVSM Impact on the Risk due to Operational Errors and Flight Contingencies</u>

According to ICAO Doc 9574, the large errors identified through the incident reports may be due to operational procedures, adverse meteorological conditions or, yet, emergency maneuvers due to failure of engine or pressurization, and can be divided into four groups:

1) *ATC-pilot loop errors and incorrect clearances;*
2) *Aircraft contingency events;*
3) *Deviations due to meteorological effects; and*
4) *Deviations due to ACAS.*

These height deviation categories permit the causes to be identified in an easier way. The definition of errors according to its causes should be based on the classification suggested by ICAO Doc 9574 according to a decision taken during The Eleventh Meeting/Workshop of Air Traffic Management (ATM) Authorities and Planners (AP/ATM/11), Lima, 25-29 of September of 2005. The deviations types and causes are described on Table 9, below:

Code	Large Height Deviations Causes (LHD)
A	Failure to climb/descend as cleared
B	Climb/descend without ATC clearance
C	Entry into airspace at an incorrect flight level
D	Deviation due to turbulence or other weather related cause
E	Deviation due to equipment failure
F	Deviation due to collision avoidance system (ACAS/TCAS) resolution advisories
G	Deviation due to contingency event
H	Aircraft not approved for operation in RVSM restricted airspace
I	ATC system loop error; (e.g. pilot misunderstands clearance message or ATC issues incorrect clearance)
J	Equipment control error encompassing incorrect operation of fully functional FMS or navigation system (e.g. by mistake the pilot incorrectly operates INS equipment)
K	Incorrect transcription of ATC clearance or re-clearance into the FMS
L	Wrong information faithfully transcribed into the FMS (e.g. flight plan followed rather than ATC clearance or original clearance followed instead of re-clearance)
M	Error in ATC-unit-to-ATC-unit transition message
N	Negative transfer received from transitioning ATC-unit
O	Other

Table 9 – Codes Used to Define the Cause of Each Reported LHD

<u>Large Height Deviation Reports</u>

Below, on Table 11, the types of errors quantified per State from January until December of 2008 are shown:

	Number of Large Height Deviations by Code													
States	**A**	**B**	**C**	**D**	**E**	**F**	**H**	**I**	**J**	**M**	**N**	**O**	**P**	**Total**
Netherlands Antilles		1								9	15		1	**26**
Argentina											6			**6**
Brazil	5	4		4	5	2	3	3	2	35	9	1		**73**
Chile	1	1								20	5			**27**
COCESNA					1					16	3		1	**21**
Colombia								1		1	2			**4**
Ecuador						1				39	24			**64**

	Number of Large Height Deviations by Code													
States	**A**	**B**	**C**	**D**	**E**	**F**	**H**	**I**	**J**	**M**	**N**	**O**	**P**	**Total**
French Guyana										4	7	1		**12**
Jamaica				1						6	3			**10**
Paraguay		1	1							4	2			**8**
Peru		1				2		4		21	1	1		**30**
Dominican Republic					1					34	15			**50**
Trinidad & Tobago	1		1					1		30	35			**68**
Uruguay										16	4			**20**
Venezuela										17	13			**30**
Total	**7**	**8**	**2**	**5**	**7**	**5**	**3**	**9**	**2**	**252**	**144**	**3**	**2**	**449**

Table 11 – Deviations Quantified per State

On Table 12, it is presented the gradual development of the parameters of the Large Height Deviation through the year of 2008, times that aircraft spent at wrong level and the number of flight level crossed without clearance:

Month	**Time Spent Same Direction [s]**	**Time Spent Opposite Direction [s]**	**Levels Crossed Same Direction**	**Levels Crossed Opposite Direction**
January/2008	14170	90	37	39
February/2008	1805	240	22	27
March/2008	4280	2580	44	47
April/2008	1810	240	20	18
May/2008	2345	1640	16	18
June/2008	2961	2490	26	29
July/2008	2960	25	36	36
August/2008	2195	25	19	21
September/2008	3030	240	35	38
October/2008	4305	90	29	28
November/2008	2980	150	19	20
December/2008	7100	180	32	31
TOTAL	**49941**	**7990**	**335**	**352**

Table 12 – Gradual Development of the Parameters of the Operational Error

Estimation of the Global Collision Risk

On Table 13, the groups of physical and dynamical parameters applied in the Reich's Collision Risk Model, as well as the main monitoring parameters, the vertical and lateral overlap probabilities and the passing frequency are presented. All the parameters were determined considering each region of the airspace as an isolated system.

Parameters	**Guayaquil Piarco**	**Amazonia P. Prince**	**Chile Cuba**	**CAR**	**SAM**	**CAR/SAM**
T^{*}	162,598	218,084	456,219	382,256	978,731	1,360,986
$P_y(0)$	0.058	0.058	0.058	0.058	0.058	0.058
$P_z(0)$	0.57	0.57	0.57	0.57	0.57	0.57
$P_z(1000)$	?	?	?	?	?	?
λ_x^{**}	0.0272400	0.025809	0.023324	0.024298	0.024425	0.0249010

Parameters	Guayaquil Piarco	Amazonia P. Prince	Chile Cuba	CAR	SAM	CAR/SAM
λ_y **	0.0244542	0.023235	0.020871	0.021416	0.022212	0.0219889
λ_z **	0.0076518	0.007371	0.006928	0.007044	0.007196	0.0071537
λ_h **	0.0272400	0.025809	0.023324	0.024298	0.024425	0.0249010
$\overline{\lvert V \rvert}$ ***	453.05	444.94	449.65	443.84	439.44	440.68
$\overline{\lvert \Delta V \rvert}$ ***	44.75	32.69	38.22	33.76	40.81	38.12
$\overline{\lvert \dot{y} \rvert}$ ***	20	20	20	20	20	20
$\overline{\lvert \dot{z} \rvert}$ ***	1.5	1.5	1.5	1.5	1.5	1.5
$\overline{\lvert \dot{z}_c \rvert}$ ***	10	10	10	10	10	10
$N_{x(oppos)}$	0.1741	0.1454	0.2892	0.3097	0.1751	0.2129
$N_{x(same)}$	0.0004	0.0015	0.0007	0.0014	0.0012	0.0013
$N_{x(equiv)}$	0.1748	0.1482	0.2903	0.3123	0.1822	0.2150
$E_{z(Xssing)}$						
S_x	80	80	80	80	80	80

*Hours [h]; **Nautical Miles [NM]; ***Nautical Miles per Hour [NM/h]

Table 13 – Summary of the Parameters Used in the Reich's Collision Risk Model for each Airspace System

The estimated values for the collision risk model are shown on Table 14, where:

- N_{az}^{tec} is the **technical vertical risk**,

Which could not be estimated because, in the following equation

- $N_{az}^{tec} = P_y(0) \times P_z(S_z) \times N_x(equivalent) \times CONSTANT$,

The lateral overlap probability [$P_y(0)$] and the vertical overlap probability [$P_z(S_z)$] were not monitored in any of the mentioned regions.

- N_{az}^{ACAS} is the **vertical risk due to incidents related to the Airborne Collision Avoidance System (ACAS)**;

It was not possible to estimate for the same reasons above, the lateral performance and the height-keeping performance were not monitored.

- N_{az}^{ne} is the **vertical risk due to aircraft leveling at a wrong level**;

It was only possible to estimate this parameter, assuming a value for a lateral standard deviation of 0.3 NM for the probability distribution function representative of an aircraft population equipped with a compatible area navigation (RNAV) equipment, and also, the highest value already considered in other airspaces for the probability of two aircrafts assigned to fly at a same level being within a vertical distance of λ_z (average aircraft height) from each other, $P_z(0) = 0,57$.

- N_{az}^{nc} is the **vertical risk due to aircraft crossing levels without clearance**;

This is the same of the previous justification.

- N_{az}^{op} is the **operational collision risk**, $N_{az}^{ne} + N_{az}^{nc}$;
- N_{az}^{Total} is the **vertical collision risk due to all causes or total risk**.

It was not possible to calculate because of the previous justifications.

	COLISION RISK RESULTS					
AIRSPACE SYSTEMS	N_{az}^{tec} [$\times 10^{-9}$]	N_{az}^{ACAS} [$\times 10^{-9}$]	N_{az}^{ne} [$\times 10^{-9}$]	N_{az}^{nc} [$\times 10^{-9}$]	N_{az}^{op} [$\times 10^{-9}$]	N_{az}^{Total} [$\times 10^{-9}$]
Guayaquil Piarco	?	?	**8.52**	**12.08**	**20.60**	?
Amazonia P. Prince	?	?	**9.64**	**6.03**	**15.67**	?
Chile Cuba	?	?	**32.75**	**12.81**	**45.56**	?
CAR	?	?	**18.35**	**63.40**	**81.75**	?
SAM	?	?	**5.02**	**3.09**	**36.1**	?
CAR/SAM	?	?	**43.2**	**8.04**	**51.6**	**?**

Reference Value: *TLS = 5.0 x 10^{-9}*

Table 14 – Collision Risk Results for the Regions

It is noticed that the collision risk for any of the regions is higher than the reference TLS of 5.0 x 10^{-9} fatal accidents per aircraft flight hour. The operational risk for the CAR region is a lot higher than the reference value, i.e. $N_{az}^{op} = 81.79 \times 10^{-9}$, or ~16 times the TLS. Brazil presents an operational risk of ~9 times the TLS, the CAR/SAM system ~10 times the TLS and the Chile-Cuba corridor ~9 times the TLS.

The safety is being compromised because of the occurrence of operational errors of all types classified by ICAO, and continues to be affected principally by common procedure errors of ATC-unit to ATC-unit transition message (code M) and negative transfer received from transitioning ATC-unit (code N). Attention should also be given to the type of errors of codes A, B, C, D, E, F, H, I, J, O and P, see Table 11.

1. Corrective Actions

To take corrective actions to eliminate all errors listed on Table 11.

To give special attention to corrective actions in order to eliminate the LHD that occurs along the routes which present higher exposure to the collision risk. On Table 15, below, the routes which present the highest number of LHD and the corresponding relative position on the exposure to the vertical collision risk rank are presented.

In conjunction with the action to eliminate the LHD causes, it is recommended that an optimization of the distribution of flights per flight level (FL) be done, with the objective of lowering the passing frequency (collision risk exposure), since the estimated collision risk value is directly proportional to the value of the passing frequency parameter.

Especial care should be given to the combination of a high number of LHD and a high value of passing frequency, particularly at routes UL780, UA315, UA550, UW58, UG436, UL550, UG437, UL795 and UL302.

A redistribution of routes and flights per flight level is strongly recommended, principally at CAR region and Brazil, particularly at the Brasilia and Recife FIR.

Rank	Routes	Nº of LHD	Collision Risk Exposure Rank
1st	UL780	35	3rd
2nd	UA315	30	6th
3rd	UA550	29	13th
4th	UG437	12	11th
5th	UG436	12	17th
6th	UA567	12	41st
7th	UL795	11	9th
8th	UL550	11	13th
9th	UG426	10	23rd
10th	UL302	10	8th
11th	UA561	9	173rd
12th	UG449	8	55th
13th	UG442	8	68th
14th	UA551	8	129th
15th	UA319	7	27th
16th	UL304	7	70th
17th	UW58	6	1st
18th	UN741	5	16th
19th	UG439	5	25th
20th	UL305	5	39th
21st	UW50	5	60th

Table 15 – Routes Which Present the Highest Number of LHD and Their Corresponding Exposure to the Vertical Collision Risk

2. Conclusions and Recommendations

On the Air Traffic Movement Data

From the 39 FIR of the CAR/SAM regions, the data received from: 8 FIR from the Caribbean region and 24 FIR from the South American region were treated.

Flight data from: 2346 notification points, 3242 route segments, and 38904 flight levels belonging to segments of 336 routes and 32 FIR were analyzed.

On the Aircraft Population

An indication of a large amount of non compliant aircraft flying at the RVSM airspace exists. The CARSAMMA agency does not have the necessary infrastructure for monitoring aircraft in order to prove such evidences. A technical monitoring program of aircraft in flight needs to be established at the CAR/SAM regions.

From the samples collected at Brazil and at the Chile-Cuba corridor, which together correspond to almost 80% of the total flight hours of the CAR/SAM regions, it was noticed that the total number of aircraft that flew in these regions represents approximately 100% of the aircraft that flew in the CAR/SAM regions. From this it was concluded that a height-keeping performance monitoring program covering the Flight Information Regions (FIR) of Brazil and Santiago-Havana would be sufficient to monitor 99.5% of aircraft that fly in the CAR/SAM regions.

On the Technical Vertical Deviation

The States of the CAR/SAM regions do not provide CARSAMMA with data about the technical vertical deviation for not having appropriate capacity of monitoring the height-keeping performance of the aircraft.

CARSAMMA, after analyzing the assessments of previous years done with data from other regions, concluded that it is not a useful practice for the CAR/SAM regions. This practice, actually, prevented CARSAMMA to take the necessary actions to ensure the safety objectives to be satisfied, since, the errors, when they existed, were corrected at the source region and, as a consequence, the errors of the CAR/SAM regions, still exist and are unknown.

On the Monitoring of the Aircraft System Errors

The same conclusions and recommendations made at the last safety assessment report presented at the meetings AP/ATM/13 (2007) and ATM/COMM/6 (2008) in regard to the data of the vertical deviation (ASE and AAD) and the data from the lateral deviation remain valid.

On the Distribution of Flights per Flight Level

From the vertical collision risk exposure point of view, generally, the routes present poor distribution of flights per level and the subutilization of the airspace it is not explored from the safety point of view.

A redistribution of routes and flights per flight level is strongly advised, principally in CAR region and Brazil, especially at the Brasilia and Recife FIR.

The distribution of flights per level seeks the fuel economy and the parameter that represents the exposure of the aircraft to the collision risk is being ignored.

An intelligent optimization of the flight level occupation in favor of safety will take, inevitably, to the reduction of the equivalent passing frequency, and, as a consequence, to the reduction of the vertical collision risk.

On the Vertical Technical Performance

It was not possible to verify the parameters lateral overlap probability [$P_y(0)$] and vertical overlap probability [$P_z(1000)$], and, as a consequence, it was not possible to verify: the global height-keeping performance specification; the MASPS criteria; the evidences of the ASE stability; the causes of the inconsistency of the height-keeping error; and the technical TLS.

On the Operational Performance

It was not possible to determine the Total Collision Risk, but it was possible to estimate the operational collision risks (due to the errors that lead the aircraft to level at a wrong level and to cross levels without clearance), assuming the maximum values of $P_y(0)$ and $P_z(0)$ considered in the safety assessment in other regions.

Results

The values of the collision risk for all the considered parts of the airspace from the CAR/SAM regions are exposing: at the CAR region the risk is 16.4 x TLS; at the SAM region the risk is 7.2 x TLS; at the CAR/SAM regions the risk is 10.32 x TLS; at Brazil the risk is 9.04 x TLS; at the Chile-Cuba corridor the risk is 9.1 x TLS; at the Guayaquil-Piarco corridor the risk is 4.12 x TLS; and at the Amazonia-Port au Prince corridor the risk is 3.13 x TLS.

The Large Height Deviations (LHD)

The main operational errors are related to ATC-unit to ATC-unit transition message (252 codes M) and negative transfer received from transitioning ATC-unit (144 codes N).

The States should become aware that every error needs a corrective action to be taken independently of any result of the risk assessment. Therefore, corrective measures should be adopted to eliminate the errors of the types listed on Table 10, i.e., errors type A, B, C, D, E, F, G, H, I, J, K, L, M, N, besides the unknown error types O and P.

LHD Code	VP 2004	IOP 2005	MP-I 2006	MP-II 2007	MP-III 2008	MP-IV 2009
A	2	2	2	0	1	7
B	3	6	0	1	8	8
C	0	0	0	0	1	2
D	0	0	0	0	6	5
E	0	0	0	0	2	7
F	0	0	1	0	2	5
H	0	0	1	0	1	3
I	0	0	6	31	2	9
J	0	0	0	0	0	2
M	16	4	56	76	197	252
N	0	0	0	1	63	144
O	0	0	0	1	0	3
P	0	0	3	3	1	2
Total	**21**	**12**	**68**	**113**	**284**	**449**

VP – Verification Phase; IOP – Initial Operational Phase; Monitoring Phase I; Monitoring Phase II; Monitoring Phase III; Monitoring Phase IV

Table 10 – Gradual Development of the Large Height Deviation (LHD)

The gradual development of the LHD presented on Table 16, corroborates the conclusions with respect to the possibility of collision at the CAR/SAM regions. Therefore, vigorous efforts are needed so that the States feel encouraged to apply additional safety measures.

On the Location of the Monitoring Facilities

It should be emphasized that, among the strategic positions chosen to install the monitoring unit system, the corridor Chile-Cuba and Brazil should be considered as strong candidates as they cover practically the entire aircraft population (listed on Table 5) flying in the CAR/SAM regions.

On the CAR/SAM Monitoring Agency

CARSAMMA is endowed with sufficient expertise to assess the safety of the airspaces. It has expertise to fulfill its obligations in regard to monitoring the airspace of the CAR/SAM regions. However, the establishment of a capacity to generate data from height keeping monitoring systems depends on a joint initiative of the States.

3. Special Recommendation

To the fulfillment of the resolution of the Fifth Meeting/Workshop of the Scrutiny Working Group (GTE/5), written below:

"2.2 Also, the meeting recalled that GREPECAS took note that RVSM post-implementation safety assessment carried considering the technical risk plus the risk for all the other causes, shows that the total risk for the CAR/SAM Regions is greater than the TLS agreed and that this total risk is influenced by large-height deviations (LHD).

2.3 Taking into consideration that the Scrutiny Group (SG) in analyzing the LHD, verified that errors are not caused by RVSM operation but for common procedures in aircraft transference from an ATC unit to another one. For this reason, new corrective actions at short and midterm were proposed, therefore, GREPECAS/13 considered that these measures are additional to those contained in Conclusion 13/61.

2.4 In addition to the short-term actions, to find a solution to the identified LHD cause, GREPECAS encouraged States and International Organizations to implement a safety management system and as far as possible, as a technological defense, to gradually implement data communications between ATS (AIDC).

2.5 On the other hand, GREPECAS/14 considered that in order to significantly reduce the occurrence of this type of errors, CAR/SAM States and International Organizations should, as an urgent matter, commit to adopt the measures referred in Conclusion GREPECAS 13/61 "Measures to reduce operational errors in the ATC coordination loop between adjacent ACCs", and particularly the error prevention programme in ATC coordination cycle between adjacent ATS units, associated to the referred conclusion and additional measures previously described (See Appendix B to this part of the report)."

4. Additional Recommendations

All the recommendations made in the assessment of 2007, which are transcribed below, remain valid:

The recommendations described in this section have the objective of helping in the efforts that will be required by the next tasks associated with the collision risk evaluation after the RVSM implementation in the CAR/SAM regions.

***Data on the Traffic Flow** – approximately 40% of the received data could not be treated due to different reasons: from lack of understanding on how the data should be transcribed to the spreadsheets to inconsistency of data. It is advisable that, before the collection of data, States pay attention to the guidelines developed for this procedure and approved by the RVSM TF.*

***Data on Technical Vertical Deviation** – a planning effort should be made to define the best methodology of data collection on technical vertical deviation. Additionally, a work program should be elaborated to show that the Altimetry System Error (ASE) for RVSM-approved aircraft remains steady. This task could be carried out along with the implementation of a monitoring program of the aircraft altimetry system performance. Such program will have to foresee the monitoring of the mentioned system of altimetry at least each two years or after 1000 flight hours per aircraft (whichever occurs later).*

***On Altimetry System Monitoring** - the CAR/SAM regions will have to establish a program for implantation of monitoring units for the verification of aircraft altimetry system. This program will have to be composed of a system of independent monitoring units (AGHME) installed in positions strategically located in the areas of higher traffic flow density. The objective is to monitor the largest possible number of aircraft for verification of the stability of the altimetry system error (ASE) and to check if the technical risk remains compatible with the agreed TLS of 2.5E-9.*

***Data on Vertical Deviations due to Operational Errors** - Information on these types of events is obtained through ATC or pilot's reports. Unfortunately important data on these deviations, like number of crossed flight levels and time spent at non-authorized flight level, are rarely informed. As these deviations are consequences of errors or contingency actions, States should develop a work plan to obtain these data with a high level of confidence and share them with CARSAMMA.*

States/International Organizations and airlines should continue to apply their best efforts toward obtaining and informing to CARSAMMA of LHD events.

On Deviation Due to the Collision Avoidance System (ACAS/TCAS) Resolution Advisories

The monitoring of the deviation due to the collision avoidance system should be effective in order to check the operational performance.

5. References

1. Manual on Implementation of a 300 m (1000 ft) Vertical Separation Minimum Between FL290 and FL410 Inclusive, ICAO, Montreal, Doc 9574, 1st edition 1992, 2nd edition 2000.
2. Avaliação de Segurança para Implementação da RVSM no Espaço Aéreo das Regiões do Caribe e da América do Sul - CAR/SAM – Fase de Verificação, Minuta CARSAMMA, Vol. 1, Novembro 2004.
3. The Guidance Material on the Implementation of a 300 m (1000 ft) Vertical Separation Minimum (VSM) between FL290 and FL410 Inclusive for Application in the Airspace of the Caribbean and South American Regions. Draft CAR/SAM Guidance Version.3, 06-05-2003.
4. Risk Assessment of RNP10 and RVSM in the South Atlantic Flight Identification Regions, ARINC, Annapolis, MD, USA, May 2001.
5. Air Traffic Services Planning Manual, Doc 9426 ICAO, Part II, Appendix C, 1984.
6. The EUR Safety Monitoring Report 2003. EUROCONTROL, Edition 1.1, 2003.
7. Review of the General Concept of Separation Panel, Report of the Sixth Meeting, ICAO, Montreal, December 1988.
8. NAT SPG Mathematicians Working Group, Risk Assessment and System Performance Monitoring for the Verification and Operation of a 300 m (1000 ft) Vertical Separation Minimum in the Minimum Navigation Performance Specifications Airspace of the North Atlantic Region, Supplement to Nat Doc 002, Draft version 2.0, 12th March 1996.
9. The EUR RVSM Pre-Implementation Safety Case, RVSM 691, Version 2.0, August 2001
10. The EUR RVSM Pos-Implementation Safety Case, RVSM A1190, Version 1.0, January 2003
11. P.G. Reich, Analysis of Long-Range Air Traffic Systems: Separation Standards, Part I, Journal of Navigation (UK), Vol. 19, No. 115, pp. 88 – 98.

12. P.G. Reich, Analysis of Long-Range Air Traffic Systems: Separation Standards, Part II, Journal of Navigation (UK), Vol. 19, No. 116, pp. 169 – 193.
13. P.G. Reich, Analysis of Long-Range Air Traffic Systems: Separation Standards, Part III, Journal of Navigation (UK), Vol. 19, No. 117, pp. 331 – 347.
14. Avaliação de Segurança para Implementação da RNP10 no Corredor Santiago-Lima, Minuta CARSAMMA, agosto 2003.
15. "An Update to the Summary of the Western Pacific/South China Sea Reduced Vertical Separation Minimum (RVSM) Safety Assessment", The Fourteenth Meeting of the ICAO RVSM Implementation Task Force, Bangkok, 30-31, May 2002.
16. RMAs Fourth Special Coordination Meeting, Canberra, Australia, 2 to 6 November 2009, RMASCN/4 – WP13.

6. List of Acronyms

AAD – Assigned Altitude Deviation

ACAS – Airborne Collision Avoidance System

ACC – Area Control Center

ASE – Altimetry System Error

ATC – Air Traffic Control

ATS – Air Traffic Service

CAR/SAM – Caribbean/South America Region

CARSAMMA – Caribbean/South America Region Monitoring Agency

CRM – Collision Risk Model

EUR – European Region

FIO – Fase Inicial de Operação (Fase Inicial de Operación)

FIR – Flight Information Region(s)

FL – Flight Level

FTE – Flight Technical Error

MASPS – Minimum Aircraft System Performance Specification

MNPS – Minimum Navigation Performance Specifications

NAT – North Atlantic Region

NM – Nautical Mile

RGCSP – Review of General Concept of Separation Panel

RA – Resolution Advisory (generated by TCAS)

RMA – Regional Monitoring Agency

RNAV – Area Navigation

RNP –Required Navigation Performance

RVSM – Reduced Vertical Separation Minimum of 300m (1000 ft)

TCAS – Traffic Alert Collision Avoidance System

TLS – Target Level of Safety

TVE – Total Vertical Error

VP - Verification Phase

WG – Working Group

APPENDIX C

CAR/SAM STRATEGY FOR THE EVOLUTION OF AIR NAVIGATION SYSTEMS

First Edition
Rev 2.0

TABLE OF CONTENTS

Page

INTRODUCTION

1.1 Acronyms

ABAS	Aircraft Based Augmentation System
ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-C	Automatic Dependent Surveillance - Contract
ANSP	Air Navigation System Provider
APV	Approach with Vertical Guidance
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
BARO-VNAV	Barometric Vertical Navigation
CAR/SAM	Caribbean and South American Regions
CAT-I	Category I Precision Approach
CAT-II	Category II Precision Approach
CAT-III	Category III precision Approach
CFIT	Controlled Flight Into Terrain
CNS/ATM	Communications, Navigation and Surveillance/Air Traffic Management
DME	Distance-Measuring Equipment
EGNOS	European Geostationary Navigation Overlay Service
FAA	Federal Aviation Administration - USA
GAGAN	GPS and Geostationary Earth Orbit Augmented Navigation - India
GALILEO	Europe’s own global navigation satellite system
GBAS	Ground Based Augmentation System
GLONASS	Global Navigation Satellite System – Russia
GLS	GBAS Landing System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GREPECAS	Caribbean and South American (CAR/SAM) Regional Planning and Implementation Group
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IRS	Inertial Reference System
LAAS	Local Area Augmentation System (USA)
MSAS	Multi-functional Satellite Augmentation System - Japan
NAVAID	Navigation Aid
NSP	Navigation Systems Panel
NDB	Non-Directional Radio Beacon
PBN	Performance-Based Navigation
RAIM	Receiver Autonomous Integrity Monitoring
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP APCH	Approach RNP
RNP AR	Approach RNP, with Authorization Required
SBAS	Satellite-Based Augmentation System
SID	Standard Instrument Departure
STAR	Standard Instrument Arrival
TMA	Terminal Control Area
VFR	Visual Flight Rules
VOR	VHF Omnidirectional Radio Range
WAAS	Wide Area Augmentation System
WGS-84	World Geodetic System -1984

1.2 Objective and general considerations

Pursuant to its terms of reference and work programme, as revised and approved by the CNS/COMM/6 meeting, the GNSS Task Force (GNSS/TF) of the CNS Committee of the GREPECAS ATM/CNS Subgroup was assigned, *inter alia*, the task of developing a draft document describing the evolution of the air navigation infrastructure required to support CAR/SAM PBN requirements.

This proposal has its origin in the initiatives of the “Global Air Navigation Plan” (Doc. 9750) and the “CAR/SAM Regional Air Navigation Plan” (Doc. 8733), based on the fact that technology is not a goal in itself, and that it must be based on operational requirements in order to attain the global ATM operational concept.

Accordingly, this proposal has been developed taking into account the following guidance and reference documents:

a) Annex 10, Volume I;

b) Strategies for the introduction and use of non-visual radio aids for approach, landing, and departure procedures in the CAR/SAM Regions (Appendix I to the CAR/SAM Air Navigation Plan, Doc 8733);

c) Guidance for the transition to satellite-based navigation systems in the CAR/SAM Regions (Appendix H to the CAR/SAM Air Navigation Plan, Doc 8733);

d) CAR/SAM PBN Roadmap, version 1.4 / July 2009;

e) GNSS Manual, Doc 9849 AN/457; and

f) Analysis of the navigation infrastructure in support of PBN.

The main objective of this strategy is to define a gradual implementation of the navigation infrastructure that will help to promote the safety, inter-functionality, and cost-effectiveness of the infrastructure needed to meet future ATM requirements, propose the activities and actions required so that the air navigation infrastructure will support the short- and medium-term PBN requirements established in the CAR/SAM PBN roadmap, and develop a long-term projection of activities and actions for air navigation infrastructure.

The CAR/SAM Strategy for the Evolution of Air Navigation Systems, hereinafter called “the Strategy”, shall be considered a guiding document for all parties involved. This document does not contain regulatory or mandatory requirements. Air navigation authorities shall publish the corresponding regulations for the introduction and use of PBN.

This strategy is a living document that shall be reviewed and updated every two years or when major modifications to the base document are being considered.

1.3 Scope of the strategy

According to this proposal, the implementation of air navigation systems responds to a harmonised CAR/SAM strategy that takes into account operational requirements and the relevant cost-benefit analyses, based on which CAR/SAM States, Territories and International Organisations may draft their action plan for the implementation of the required navigation systems, in keeping with CAR/SAM implementation dates.

To better understand this air navigation strategy, the operational requirements, the required navigation infrastructure, the regional studies and trials proposed in this document are presented in chronological order. The timetable for this proposal is the same as that of the CAR/SAM PBN roadmap for the short (2006-2010), medium (2011-2015) and long term (2016+).

The dates indicated herein are tentative dates in which air navigation systems will be operational at regional level. However, some of the air navigation systems described in this strategy will be used for resolving local problems prior to the dates established in this document, so there will be a migration from these pioneering areas to broader regional areas.

The policy for the implementation of the new air navigation technologies in the CAR/SAM Regions should be based first on voluntary implementation in specific areas, using the existing certified equipment, followed by implementation in more extensive areas, supported by the respective regulations and updated equipment.

1.4 Structure of the document

This document is structured as follows:

- Section 1 (this section) lists the acronyms used, the purpose of the document, explains its scope and structure, and describes the target audience.

- Section 2 describes the evolution of the Air Navigation Operational Scenario, that is, the short- (2009-2010), medium- (2011-2015) and long-term (2016-2025) operational requirements for en route and terminal airspace, aerodrome operations, and on-board systems.

- Section 3 describes the evolution of the air navigation infrastructure required to support the envisaged operational scenario.

- Section 4 specifies a tentative action plan, whose timely implementation will promote the operational use of the new GNSS technologies.

1.5 Target audience

This strategy has been developed to assist States/Territories/International Organisations, as well as aviation community stakeholders, in the implementation of PBN, of the plan for the future transition, and of the corresponding investment strategies.

The main aviation community stakeholders in the CAR/SAM Regions that will benefit from this strategy are:

- Regulatory agencies, the national regulatory authorities of CAR/SAM States/Territories/International Organisations responsible for the verification of air navigation systems;

- Air navigation service providers (ANSPs). Civil and military air navigation service providers of CAR/SAM States/Territories/International Organisations responsible for the acquisition/design, acceptance, and maintenance of air navigation systems;

- Airport operators responsible for the acquisition/design, acceptance, and maintenance of navigation systems at the airports;

- Airspace users, who are the end users of air navigation systems; and

- International organisations.

2. EVOLUTION OF THE OPERATIONAL SCENARIO, ACCORDING TO THE CAR/SAM PBN ROADMAP

2.1 Oceanic airspace – En-route operations

a) Taking into account low air traffic density in oceanic airspaces, no significant short-term changes are expected in the existing airspace structure that would require changes in the applicable RNAV specifications. In airspaces where RNP-10 is applied (EUR/SAM corridor, Lima-Santiago de Chile and South Atlantic Random Route System), no changes are expected in the short term.

b) In oceanic airspace, it is expected that RNP 4 will be applied in the medium term, using ADS/CPDLC, to enable 30 NM lateral and longitudinal separations. This application will depend on the evolution of the aircraft fleet flying in the airspace.

2.2 Continental airspace – En-route operations

a) In the short term, RNAV-5 is envisaged in selected airspaces where operational benefits can be derived and where the available CNS infrastructure will support it.

b) In the medium term, RNP-2 is expected in selected high-density continental airspaces, using GNSS only, taking into account that the ground infrastructure will not support RNAV applications. The establishment of a backup system for GNSS will be required, as well as the development of contingency procedures in case of GNSS failure. The use of RNP-2 will facilitate the application of PBN in airspaces that lack surveillance. With the use of GNSS alone, it will be necessary to obtain more information from the GNSS signal through the use of GPS monitoring systems.

2.3 Continental airspace – Terminal control area (TMA)

a) In the short term, the implementation of RNAV-1 is expected in TMAs selected by the States, under radar coverage, and with the appropriate ground navigation infrastructure that allows for DME/DME and DME/DME/INS operations. During this phase, both equipped and non-equipped aircraft will be allowed to operate, and RNAV-1 operations shall begin once the appropriate percentage of approved air operations has been achieved.

b) In non-radar environments and/or where there is no appropriate ground navigation infrastructure, the implementation of RNP-1 in the short term is expected in TMAs selected by the States, using GNSS alone, provided there is an appropriate percentage of approved air operations. Both approved and non-approved aircraft will also be allowed to operate in these TMAs.

c) PBN approach procedures shall be implemented in the short term as approach procedures with vertical guidance (APV) using baro-VNAV for runways, be it as primary approach or as backup for all final approaches to the runway, based on RNP APCH or RNP AR APCH navigation specifications.

d) Use of RNP APCH (basic GNSS) approach procedures is expected in the short term in most international airports selected by the State, maintaining conventional approach procedures for conventional non-equipped aircraft.

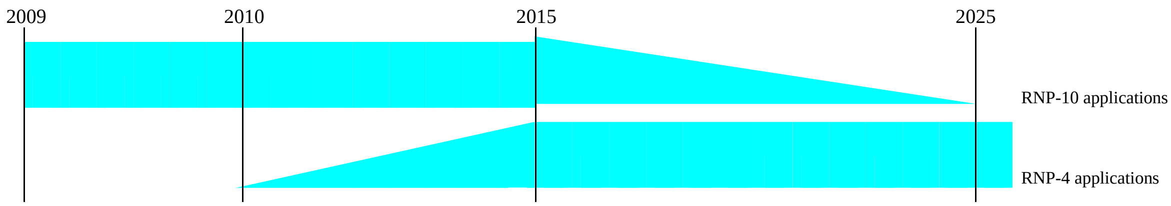
e) Use of RNP AR approach procedures is expected in the short term at airports selected by the State, where operational benefits to be obtained are evident, based on the existence of significant obstacles.

f) In the medium term, it is expected that RNAV or RNP 1 applications will be extended to TMAs selected by the States, depending on ground infrastructure and aircraft navigation capabilities. At more complex TMAs, the use of RNAV or RNP 1 (exclusionary airspace) equipment will be mandatory. At less complex TMAs, both equipped and non-equipped aircraft will be allowed to operate.

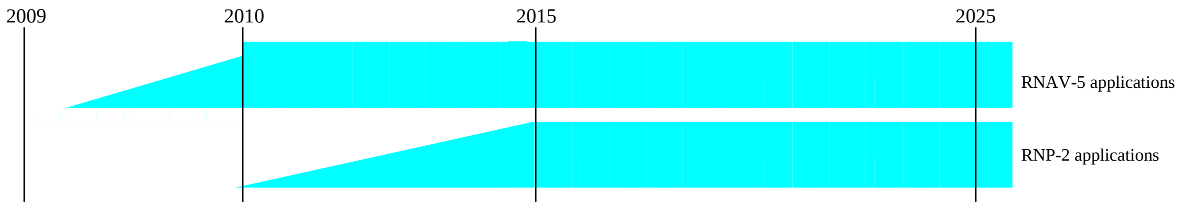
g) In the medium term, it is expected that RNP APCH and RNP AR procedures will be extended to selected airports. Initial implementation of GLS procedures is also envisaged, thus ensuring a smooth TMA-to-approach transition, basically using GNSS for the two phases.

2.4 Timetable for operational requirements

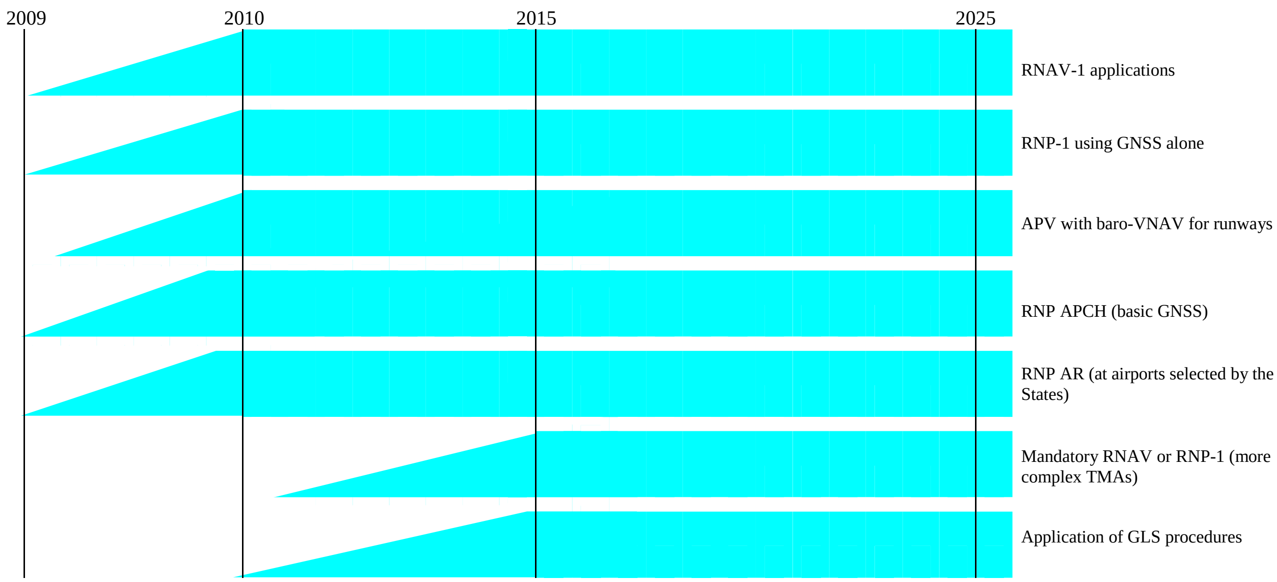
Oceanic airspace



Continental airspace – En-route operations



Continental airspace –TMA operations



3. EVOLUTION OF AIR NAVIGATION INFRASTRUCTURE

3.1 Short term (up to 2010)

a) Initial deactivation of NDBs.

b) Definition of the GNSS backup infrastructure.

c) Changes to DME infrastructure to meet ICAO RNAV (DME/DME) requirements at selected TMAs.

d) Initial implementation of ABAS for en-route, TMA, and NPA operations.

3.2 Medium term (2011-2015)

a) The implementation of GBAS CAT I stations at airports with sufficient operational demand will improve en-route and TMA operations (SIDs and STARs) on paths similar to those of the ILS.

b) At some airports, ILS systems will be maintained as GNSS/GBAS backup.

c) Initial deactivation of VOR for en-route operations.

3.3 Long term (2016-2025)

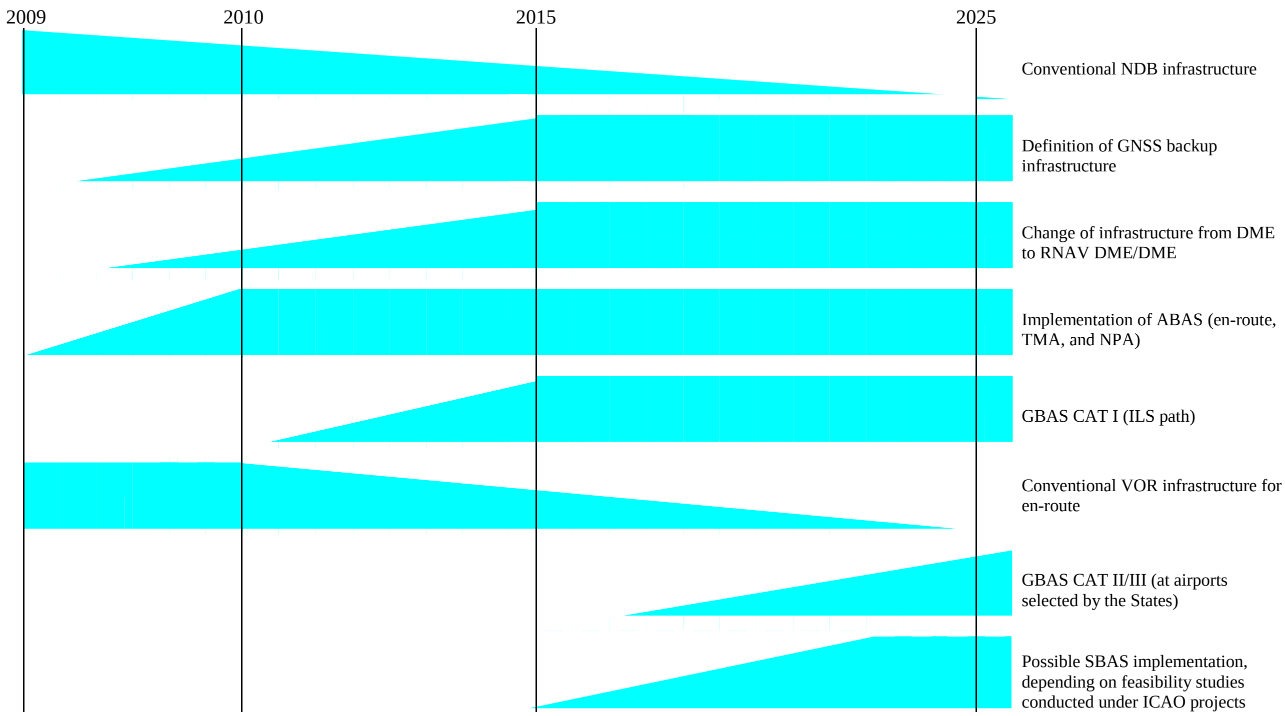
a) Continue deactivating conventional aids, maintaining the backup structure, if necessary.

b) Implementation of GBAS Cat II/III at selected airports.

c) Implementation of GBAS CAT I approach at other CAR/SAM airports with sufficient operational demand.

d) Possible implementation of SBAS, depending on feasibility studies already carried out and underway under ICAO projects, taking into account current mono-frequency systems and the evolution of ionosphere algorithms, as well as the future availability of a multi-frequency, multi-constellation satellite structure.

3.4 Timetable for air navigation infrastructure



4. TENTATIVE ACTION PLAN

4.1 Short term (up to 2010)

a) The implementation of an automatic tool for the development of procedures should be established in order to meet the new demand for procedures such as RNAV and RNP.

b) Analysis of DME/DME coverage and DME implementation to support operations, and introduction of improvements.

4.2 Medium term (2011-2015)

a) In order to determine which airports are suitable for the installation of GBAS CAT I stations, each State must make a cost-benefit analysis based on its own operational demand.

b) For each eligible airport, a GBAS ionosphere threat model will be required for certification and commissioning purposes.

c) Complete and conclude the SACCSA project to see the possibility of implementing an SBAS system in the CAR/SAM Regions.

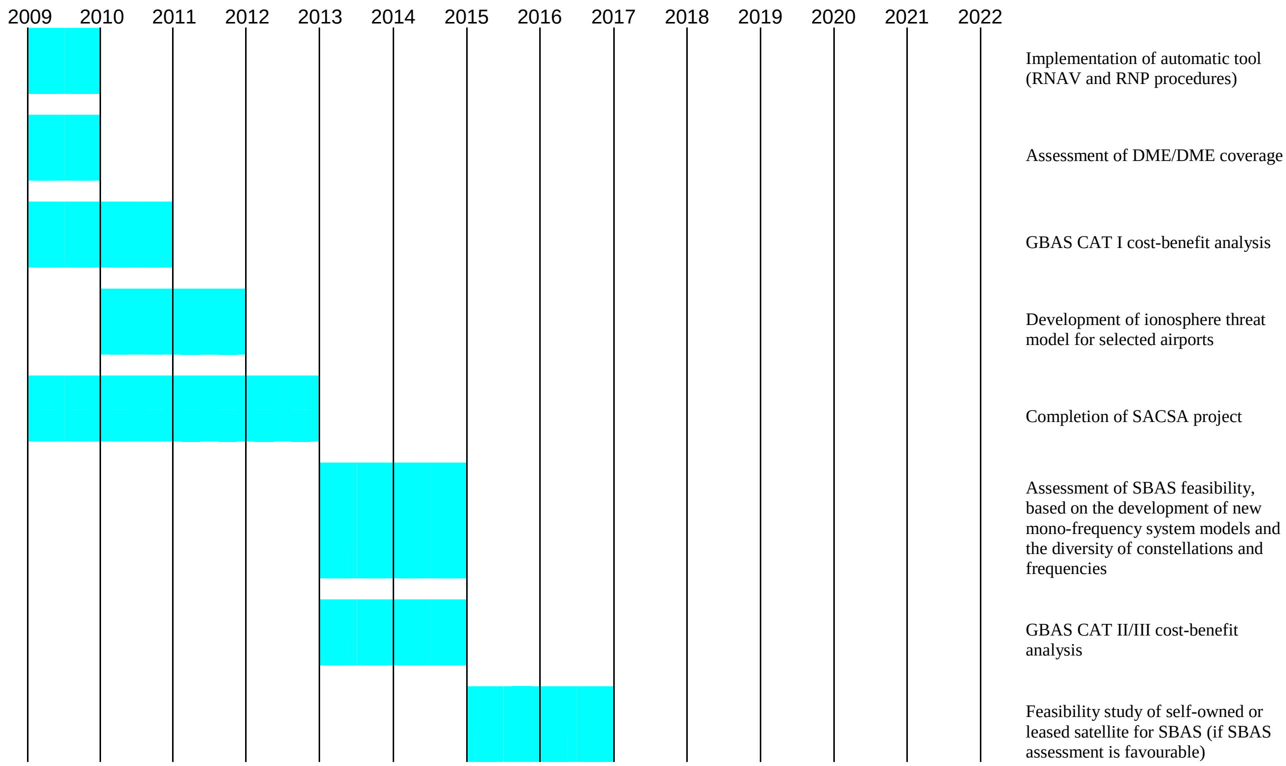
d) Assess the technical, operational, and financial feasibility of SBAS systems, based on the development of new mono-frequency system models, the future implementation of GPS operations, and the commissioning of the GALILEO constellation.

4.3 Long term (2016-2025)

a) In order to determine which airports are suitable for the installation of GBAS CAT II/III stations, each State must conduct a cost-benefit analysis, based on its own operational demand.

b) SBAS operations with a self-owned or leased GEO satellite, which could enable SBAS operations independently from WAAS and/or EGNOS.

4.4 Action Plan timetable



APPENDIX D / APENDICE D

IATA SURVEY FORM ON CURRENT AND FUTURE AVIONICS / FORMULARIO DE ENCUESTA IATA SOBRE AVIONICA EXISTENTE Y FUTURA

Airspace Planning - Equipment Survey Version 5

NOTES:

(1) Data provided will be de-identified before publication unless specific permission is obtained from the airline(s) concerned to identify the source.
(2) In the pull down menus, BF = BEFORE. BF2010 means before the year 2010.
(3) Please use your flight plan aircraft type designator for each type.

Airline two letter IATA code >>>>>>> | **If your airline is not an IATA member, please enter your airline name** >>>>>>>

Aircraft types you CURRENTLY operate *See note (3)*			Number of aircraft	Expected Fleet Retire Date	
Aircraft type 1		>>>>>>			>>>>>>
Aircraft type 2		>>>>>>			>>>>>>
Aircraft type 3		>>>>>>			>>>>>>
Aircraft type 4		>>>>>>			>>>>>>
Aircraft type 5		>>>>>>			>>>>>>
Aircraft type 6		>>>>>>			>>>>>>
FUTURE FLEET 1		**Service Entry Date**			>>>>>>
FUTURE FLEET 2		**Service Entry Date**			>>>>>>

Regions where you operate or propose to operate these aircraft (Please select all that apply and estimate the number of flights or projected flights per week)

	AFI	Flights	ARABIAN SEA	Flights	ASIA	Flights	EUR	Flights	INDIAN OCEAN	Flights	LATAM	Flights	MID	Flights	NAM	Flights	Atlantic - NAT	Flights	Atlantic - SAT	Flights	Pacific - NOPAC/CENPAC	Flights	Pacific - SOPAC	Flights	POLAR	Flights
Aircraft type 1																										
Aircraft type 2																										
Aircraft type 3																										
Aircraft type 4																										
Aircraft type 5																										
Aircraft type 6																										
FUTURE FLEET 1																										
FUTURE FLEET 2																										

Aircraft Equipment and Capabilities >>>>>>	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Future Fleet 1	Future Fleet 2
This line will autofill from your aircraft type entries	0	0	0	0	0	0	0	0
FANS 1/A								
FMS RTA								
ADS-C								
ADS-B OUT (Mode S ES) DO-260 transponder								
ADS-B OUT (Mode S ES) DO-260**A** transponder								
ADS-B OUT (Mode S ES) DO-260**B** transponder								
If fitted with ADS-B, ***Transponder Power Output***								
ADS-B IN (Mode S ES) with EFB display								
ADS-B IN (Mode S ES) with other MFD								
CPDLC via ACARS-CPDLC FANS 1/A VDL Mode A								
CPDLC via FANS 1/A VDL Mode 2								
CPDLC via ATN VDL Mode 2								
CPDLC FANS 1/A SATCOM (INMARSAT / MTSAT)								
CPDLC FANS 1/A SATCOM (IRIDIUM)								
CPDLC via FANS 1/A HFDL								
Digital Data Link (ARINC 623)								
GPS								
GPS TSO status								
GLS (GBAS)								
RNP 10 (RNAV 10)								
RNAV 5								
RNP 4								
PRNAV								
RNAV 2/1								
Basic RNP 1								
RNP APCH								
RNP AR APCH								
APV BARO VNAV (LNAV / VNAV)								
RNP 0.xx (select from pull down menu)								
DME								
FMC WPR ACARS								
RF / FRT Turn Capability								
HF RTF								
Inertial Navigation								
ILS								
ATC RTF SATCOM (INMARSAT / MTSAT)								
ATC RTF SATCOM (IRIDIUM)								
VHF RTF (8kHz33)								

Additional Information You Wish To Provide

Thank you for your assistance with the survey. Please send the completed spreadsheet to infrastructure@iata.org **Click >>>** infrastructure@iata.org

Version 5 built 29 August 2009

APPENDIX E / APENDICE E

IPV4 ADDRESSING SCHEME
ESQUEMA DE DIRECCIONAMIENTO IPV4

SAM REGION INTER-/INTRA-REGIONAL LINKS
ENLACES INTER-/INTRA-REGIONALES CORRESPONDIENTES A LA REGION SAM

NETWORK/ RED	LINK / ENLACE				
	No.	SUBNETWORK/ SUBRED	CONNECTED ROUTERS/ ENCAMINADORES CONECTADOS	ADDRESSES TO USE / DIRECCIONES A UTILIZAR	
1	2	3	4	5	
10.15.224.0 / 19	1	10.15.224.0 / 30	Argentina-Bolivia	-	10 - 15 - 224 - 0 / 30
				Argentina	10 - 15 - 224 - 1 / 30
				Bolivia	10 - 15 - 224 - 2 / 30
				-	10 - 15 - 224 - 3 / 30
	2	10.15.224.4 / 30	Argentina-Chile	-	10 - 15 - 224 - 4 / 30
				Argentina	10 - 15 - 224 - 5 / 30
				Chile	10 - 15 - 224 - 6 / 30
				-	10 - 15 - 224 - 7 / 30
	3	10.15.224.8 / 30	Argentina-Paraguay	-	10 - 15 - 224 - 8 / 30
				Argentina	10 - 15 - 224 - 9 / 30
				Paraguay	10 - 15 - 224 - 10 / 30
				-	10 - 15 - 224 - 11 / 30
	4	10.15.224.12 / 30	Argentina-Peru	-	10 - 15 - 224 - 12 / 30
				Argentina	10 - 15 - 224 - 13 / 30
				Peru	10 - 15 - 224 - 14 / 30
				-	10 - 15 - 224 - 15 / 30
	5	10.15.224.16 / 30	Argentina-Uruguay	-	10 - 15 - 224 - 16 / 30
				Argentina	10 - 15 - 224 - 17 / 30
				Uruguay	10 - 15 - 224 - 18 / 30
				-	10 - 15 - 224 - 19 / 30
	6	10.15.224.20 / 30	Argentina-AFI	-	10 - 15 - 224 - 20 / 30
				Argentina	10 - 15 - 224 - 21 / 30
				AFI (Johannesburgo)	10 - 15 - 224 - 22 / 30
				-	10 - 15 - 224 - 23 / 30
	7	10.15.224.24 / 30	Brasil-Colombia	-	10 - 15 - 224 - 24 / 30
				Brasil	10 - 15 - 224 - 25 / 30
				Colombia	10 - 15 - 224 - 26 / 30
				-	10 - 15 - 224 - 27 / 30
	8	10.15.224.28 / 30	Brasil-Guyana	-	10 - 15 - 224 - 28 / 30
				Brasil	10 - 15 - 224 - 29 / 30
				Guyana	10 - 15 - 224 - 30 / 30
				-	10 - 15 - 224 - 31 / 30

NETWORK/ RED	LINK / ENLACE				
	No.	SUBNETWORK/ SUBRED	CONNECTED ROUTERS/ ENCAMINADORES CONECTADOS	ADDRESSES TO USE / DIRECCIONES A UTILIZAR	
1	2	3	4	5	
10.15.224.0 / 19	9	10.15.224.32 / 30	Brasil-French Guiana	-	10 - 15 - 224 - 32 / 30
				Brasil	10 - 15 - 224 - 33 / 30
				French Guiana	10 - 15 - 224 - 34 / 30
				-	10 - 15 - 224 - 35 / 30
	10	10.15.224.36 / 30	Brasil-Peru	-	10 - 15 - 224 - 36 / 30
				Brasil	10 - 15 - 224 - 37 / 30
				Peru	10 - 15 - 224 - 38 / 30
				-	10 - 15 - 224 - 39 / 30
	11	10.15.224.40 / 30	Brasil-Suriname	-	10 - 15 - 224 - 40 / 30
				Brasil	10 - 15 - 224 - 41 / 30
				Suriname	10 - 15 - 224 - 42 / 30
				-	10 - 15 - 224 - 43 / 30
	12	10.15.224.44 / 30	Brasil-Venezuela	-	10 - 15 - 224 - 44 / 30
				Brasil	10 - 15 - 224 - 45 / 30
				Venezuela	10 - 15 - 224 - 46 / 30
				-	10 - 15 - 224 - 47 / 30
	13	10.15.224.48 / 30	Brasil-AFI	-	10 - 15 - 224 - 48 / 30
				Brasil	10 - 15 - 224 - 49 / 30
				AFI (Dakar)	10 - 15 - 224 - 50 / 30
				-	10 - 15 - 224 - 51 / 30
	14	10.15.224.52 / 30	Brasil-EUR	-	10 - 15 - 224 - 52 / 30
				Brasil	10 - 15 - 224 - 53 / 30
				EUR (Madrid)	10 - 15 - 224 - 54 / 30
				-	10 - 15 - 224 - 55 / 30
	15	10.15.224.56 / 30	Brasil-NAM	-	10 - 15 - 224 - 56 / 30
				Brasil	10 - 15 - 224 - 57 / 30
				NAM (Atlanta)	10 - 15 - 224 - 58 / 30
				-	10 - 15 - 224 - 59 / 30
	16	10.15.224.60 / 30	Brasil-Argentina	-	10 - 15 - 224 - 60 / 30
				Brasil	10 - 15 - 224 - 61 / 30
				Argentina	10 - 15 - 224 - 62 / 30
				-	10 - 15 - 224 - 63 / 30
	17	10.15.224.64 / 30	Brasil-Bolivia	-	10 - 15 - 224 - 64 / 30
				Brasil	10 - 15 - 224 - 65 / 30
				Bolivia	10 - 15 - 224 - 66 / 30
				-	10 - 15 - 224 - 67 / 30
	18	10.15.224.68 / 30	Brasil-Paraguay	-	10 - 15 - 224 - 68 / 30
				Brasil	10 - 15 - 224 - 69 / 30
				Paraguay	10 - 15 - 224 - 70 / 30
				-	10 - 15 - 224 - 71 / 30
	19	10.15.224.72 / 30	Brasil-Uruguay	-	10 - 15 - 224 - 72 / 30
				Brasil	10 - 15 - 224 - 73 / 30
				Uruguay	10 - 15 - 224 - 74 / 30
				-	10 - 15 - 224 - 75 / 30

NETWORK/ RED	LINK / ENLACE No.	SUBNETWORK/ SUBRED	CONNECTED ROUTERS/ ENCAMINADORES CONECTADOS	ADDRESSES TO USE / DIRECCIONES A UTILIZAR	
1	2	3	4	5	
10.15.224.0 / 19	20	10.15.224.76 / 30	Chile-PAC	-	10 - 15 - 224 - 76 / 30
				Chile	10 - 15 - 224 - 77 / 30
				PAC (Christchurch)	10 - 15 - 224 - 78 / 30
				-	10 - 15 - 224 - 79 / 30
	21	10.15.224.80 / 30	Chile-Peru	-	10 - 15 - 224 - 80 / 30
				Chile	10 - 15 - 224 - 81 / 30
				Peru	10 - 15 - 224 - 82 / 30
				-	10 - 15 - 224 - 83 / 30
	22	10.15.224.84 / 30	Colombia-NAM	-	10 - 15 - 224 - 84 / 30
				Colombia	10 - 15 - 224 - 85 / 30
				NAM (Atlanta)	10 - 15 - 224 - 86 / 30
				-	10 - 15 - 224 - 87 / 30
	23	10.15.224.88 / 30	Colombia-Ecuador	-	10 - 15 - 224 - 88 / 30
				Colombia	10 - 15 - 224 - 89 / 30
				Ecuador	10 - 15 - 224 - 90 / 30
				-	10 - 15 - 224 - 91 / 30
	24	10.15.224.92 / 30	Colombia-Peru	-	10 - 15 - 224 - 92 / 30
				Colombia	10 - 15 - 224 - 93 / 30
				Peru	10 - 15 - 224 - 94 / 30
				-	10 - 15 - 224 - 95 / 30
	25	10.15.224.96 / 30	Colombia-Venezuela	-	10 - 15 - 224 - 96 / 30
				Colombia	10 - 15 - 224 - 97 / 30
				Venezuela	10 - 15 - 224 - 98 / 30
				-	10 - 15 - 224 - 99 / 30
	26	10.15.224.100 / 30	Ecuador-Peru	-	10 - 15 - 224 - 100 / 30
				Ecuador	10 - 15 - 224 - 101 / 30
				Peru	10 - 15 - 224 - 102 / 30
				-	10 - 15 - 224 - 103 / 30
	27	10.15.224.104 / 30	Ecuador-Venezuela	-	10 - 15 - 224 - 104 / 30
				Ecuador	10 - 15 - 224 - 105 / 30
				Venezuela	10 - 15 - 224 - 106 / 30
				-	10 - 15 - 224 - 107 / 30
	28	10.15.224.108 / 30	French Guiana-Suriname	-	10 - 15 - 224 - 108 / 30
				French Guiana	10 - 15 - 224 - 109 / 30
				Suriname	10 - 15 - 224 - 110 / 30
				-	10 - 15 - 224 - 111 / 30
	29	10.15.224.112 / 30	Guyana-C-CAR	-	10 - 15 - 224 - 112 / 30
				Guyana	10 - 15 - 224 - 113 / 30
				C-CAR (Piarco)	10 - 15 - 224 - 114 / 30
				-	10 - 15 - 224 - 115 / 30
	30	10.15.224.116 / 30	Guyana-Suriname	-	10 - 15 - 224 - 116 / 30
				Guyana	10 - 15 - 224 - 117 / 30
				Suriname	10 - 15 - 224 - 118 / 30
				-	10 - 15 - 224 - 119 / 30

NETWORK/ RED	LINK / ENLACE				
	No.	SUBNETWORK/ SUBRED	CONNECTED ROUTERS/ ENCAMINADORES CONECTADOS	ADDRESSES TO USE / DIRECCIONES A UTILIZAR	
1	2	3	4	5	
10.15.224.0 / 19	31	10.15.224.120 / 30	Guyana-Venezuela	-	10 - 15 - 224 - 120 / 30
				Guyana	10 - 15 - 224 - 121 / 30
				Venezuela	10 - 15 - 224 - 122 / 30
				-	10 - 15 - 224 - 123 / 30
	32	10.15.224.124 / 30	Peru-NAM	-	10 - 15 - 224 - 124 / 30
				Peru	10 - 15 - 224 - 125 / 30
				NAM (Atlanta)	10 - 15 - 224 - 126 / 30
				-	10 - 15 - 224 - 127 / 30
	33	10.15.224.128 / 30	Peru-Bolivia	-	10 - 15 - 224 - 128 / 30
				Peru	10 - 15 - 224 - 129 / 30
				Bolivia	10 - 15 - 224 - 130 / 30
				-	10 - 15 - 224 - 131 / 30
	34	10.15.224.132/ 30	Peru-Colombia	-	10 - 15 - 224 - 132 / 30
				Peru	10 - 15 - 224 - 133 / 30
				Colombia	10 - 15 - 224 - 134 / 30
				-	10 - 15 - 224 - 135 / 30
	35	10.15.224.136 / 30	Peru-Venezuela	-	10 - 15 - 224 - 136 / 30
				Peru	10 - 15 - 224 - 137 / 30
				Venezuela	10 - 15 - 224 - 138 / 30
				-	10 - 15 - 224 - 139 / 30
	36	10.15.224.140 / 30	Suriname-Venezuela	-	10 - 15 - 224 - 140 / 30
				Suriname	10 - 15 - 224 - 141 / 30
				Venezuela	10 - 15 - 224 - 142 / 30
				-	10 - 15 - 224 - 143 / 30
	37	10.15.224.144 / 30	Venezuela-CAM	-	10 - 15 - 224 - 144 / 30
				Venezuela	10 - 15 - 224 - 145 / 30
				CAM (San Juan)	10 - 15 - 224 - 146 / 30
				-	10 - 15 - 224 - 147 / 30
	38	10.15.224.148 / 30	Venezuela-EUR	-	10 - 15 - 224 - 148 / 30
				Venezuela	10 - 15 - 224 - 149 / 30
				EUR (Madrid)	10 - 15 - 224 - 150 / 30
				-	10 - 15 - 224 - 151 / 30
	39	10.15.224.152 / 30	Venezuela-Trinidad & Tobago	-	10 - 15 - 224 - 152 / 30
				Venezuela	10 - 15 - 224 - 153 / 30
				Trinidad & Tobago	10 - 15 - 224 - 154 / 30
				-	10 - 15 - 224 - 155 / 30
	40	10.15.224.156 / 30	VACANTE	-	10 - 15 - 224 - 156 / 30
				-	10 - 15 - 224 - 157 / 30
				-	10 - 15 - 224 - 158 / 30
				-	10 - 15 - 224 - 159 / 30
	41	10.15.224.160 / 30	VACANTE	-	10 - 15 - 224 - 160 / 30
				-	10 - 15 - 224 - 161 / 30
				-	10 - 15 - 224 - 162 / 30
				-	10 - 15 - 224 - 163 / 30

NETWORK/ RED	LINK / ENLACE				
	No.	SUBNETWORK/ SUBRED	CONNECTED ROUTERS/ ENCAMINADORES CONECTADOS	ADDRESSES TO USE / DIRECCIONES A UTILIZAR	
1	2	3	4	5	
10.15.224.0 / 19	42	10.15.224.164 / 30	VACANTE	-	10 - 15 - 224 - 164 / 30
				-	10 - 15 - 224 - 165 / 30
				-	10 - 15 - 224 - 166 / 30
				-	10 - 15 - 224 - 167 / 30
	-	-	-	-	-
					-
					-
				-	-
	-	-	-	-	-
					-
					-
				-	-
	2048 (last/ última)	10.15.224.252 / 30	VACANTE	-	10 - 15 - 224 - 252 / 30
					10 - 15 - 224 - 253 / 30
					10 - 15 - 224 - 254 / 30
				-	10 - 15 - 224 - 255 / 30

APPENDIX F

SURVEILLANCE STRATEGY FOR THE CAR/SAM REGIONS

First Edition
Rev 2.0

TABLE OF CONTENTS

1. Introduction

1.1 General Considerations

Within the context of the GREPECAS/14, the Surveillance Regional Plan was updated and it was recognized that further analysis on that matter should take place by CNS Committee. The CNS Surveillance Task Force (CNS/SUR/TF) was then created and tasked, among other activities, to define a unified Air Surveillance Strategy for CAR/SAM Regions.

Subsequently, this initial document is the result of the task assigned to CNS Committee - CNS/SUR/TF, in which the preliminary elements for a Regional CAR/SAM Strategy in short, medium and long term for ADS-C and ADS-B use have been integrated into an Unified Regional Strategy for the Implementation of Surveillance Systems.

This surveillance strategy is derived from the “Global Air Navigation Plan for CNS/ATM Systems” (Doc. 9750) and the “CAR/SAM Regional Air Navigation Plan” (Doc. 8733), since technology is not an end in itself and should be based on clearly established operational requirements for ATM evolution.

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

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.

This strategy is a live document and should be reviewed and updated every two years.

1.2 Scope of the Surveillance Strategy

The 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.

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.

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

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

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 displayed in each chapter in a chronological presentation.

The timeframes illustrated in this document define the tentative dates 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 timescales in this document, and thereby will migrate from pioneer areas into bigger regional areas.

In other words, new surveillance technologies implementation policy for CAR/SAM Region should be first based on a voluntary initiatives 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.

1.3 Structure of the Document

This document is structured as follows:

- Section 1 (this section) presents the general considerations, explains its scope and structure and describes its intended readers.
- Section 2 describes the Surveillance Operational Scenario Evolution, i.e. the envisaged operational drivers for short (2009-2010), medium (2010-2015) and long terms (2015-2025) in the Air Surveillance field, for En-Route and TMA Airspace, Aerodrome Operations and Aircraft Systems.
- Section 3 specifies 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 principles of known surveillance techniques.

1.4 Intended Readers

This strategy was developed to the following stakeholders group within CAR/SAM Region:

- 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 who 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 client of the ATM Surveillance Systems chain.

2. Surveillance Operational Scenario Evolution

2.1 En-Route and TMA Airspace

The surveillance operational scenario evolution for En-Route and TMA airspace is based on two 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 cooperative targets in TMA and en-route airspace; and
- Dependent cooperative surveillance.

2.1.1 **Short term (until 2010)**

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

2.1.2 **Medium term (2010-2015)**

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

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 full operational capability status in 2015.

2.1.3 **Long term (until 2015-2025)**

Another set of possible new applications is 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.

It is expected that an integration of airport and airspace surveillance will become more widespread in long term. 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.

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 begin to drive the evolution of the surveillance environment, these are:

- Enhanced planning with the tasks of the controllers operating in En-Route and TMA sectors becoming increasingly supported by more automation. The controller will make use of more 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. This 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 2010)**

For selected airports, detection of all mobiles within the aerodrome area is permanent throughout the whole strategy timeframe.

2.2.2 **Medium term (2010-2015)**

The use of ADDs to support aerodrome operations is envisaged; and the implementation of A-SMGCS level I (which may include 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)**

Where airport operators foresee a benefit, a long term implementation of A-SMGCS level III (which may include the 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 2010)**

In short term, the use of SSR or SSR Mode S transponders for ground based surveillance radar or Multilateration systems will continue. This means that no additional equipment is foreseen on the aircraft until 2010.

2.3.2 **Medium term (2010-2015)**

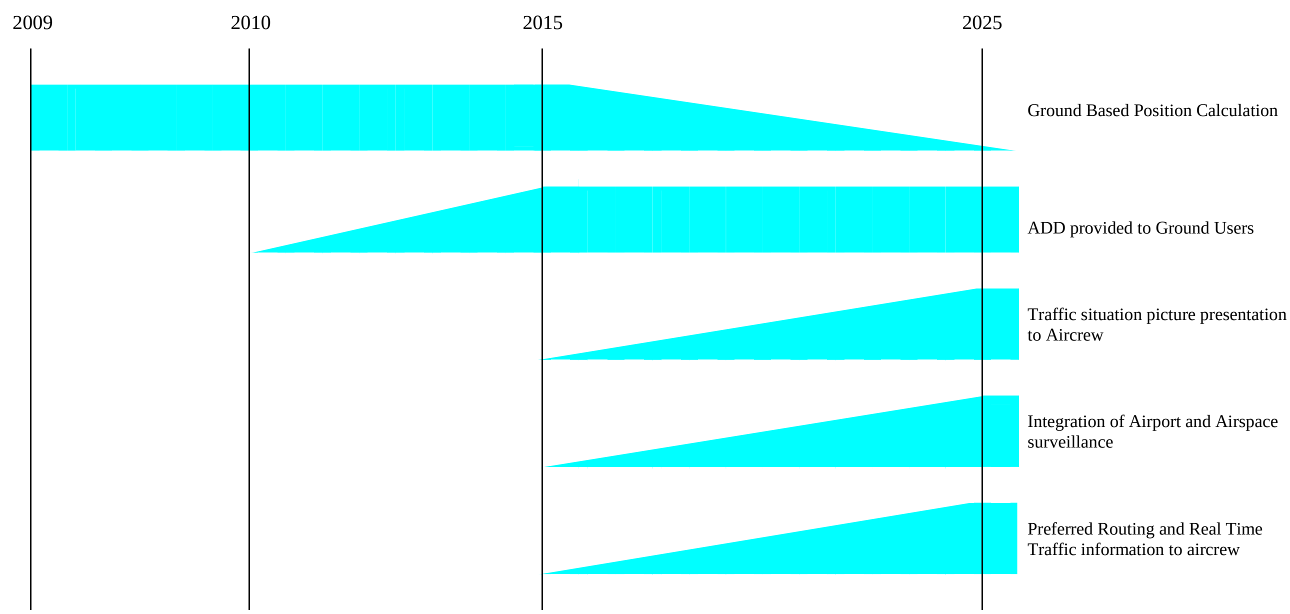
The implementation of new ground Surveillance Applications (ADS-B out), which will require integration between the aircraft navigation system and mode S transponders, in order to transmit intent information to other aircraft and ground users. This is enabled by ADS-B, using 1090 MHz Extended Squitter.

2.3.3 **Long term (until 2015-2025)**

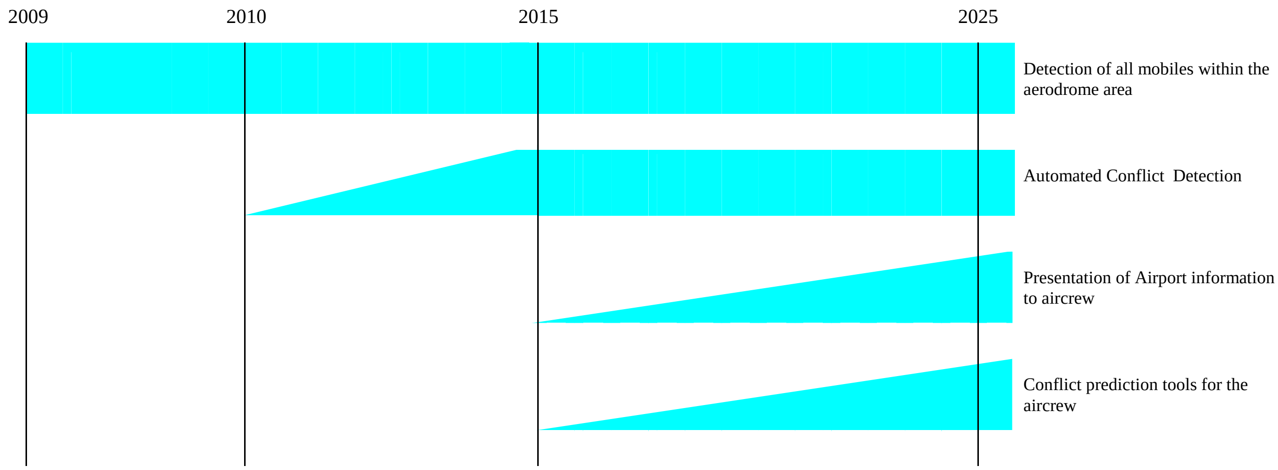
The implementation of ADS-B ASAS situational awareness applications will require an additional airborne SDPS and display system.

2.4 **Operational Drivers Timeframe**

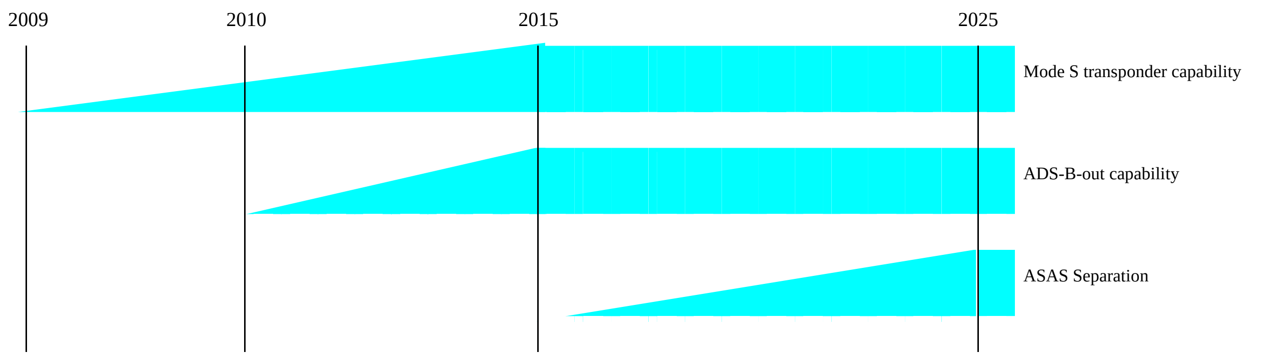
En Route and TMA Airspace



Aerodrome Operations



Aircraft Systems



3. Surveillance Infrastructure Evolution

3.1 En-Route and TMA Airspace

3.1.1 Short term (until 2010)

Co-operative surveillance, in the form of SSR radars, 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, 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.

3.1.2 Medium term (2010-2015)

SSR Mode S surveillance will be implemented in high density, State-selected TMAs in order to improve secondary radar performances. Since there will still exist legacy aircrafts that won’t be able to reply on mode S, a mixed mode interrogation will be required up to 2015.

Ground implementation for ADS-B (based on ES Mode S receivers) will increase 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.

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.

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

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

3.1.3 **Long term (until 2015-2025)**

It is predicted that by 2020 the majority of the SSR and SSR Mode S systems currently installed are at the end of their operational life. Therefore, SSR Mode A/C radars that have completed their life cycle by that time won’t be replaced anymore. ADS-B or multilateration systems will fully replace those decommissioned SSRs.

3.2 **Aerodrome Operations**

3.2.1 **Short term (until 2010)**

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 (2010-2015)**

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)**

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 2010)**

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 2010 on that matter.

Until 2010 the implementation of ACAS II systems throughout commercial and general aviation will be almost completed, using Mode S transponder.

3.3.2 **Medium term (2010-2015)**

Begin the update of Mode S transponders, by integrating them to GNSS airborne systems, so that they will operate in ADS-B environments (ADS-B out).

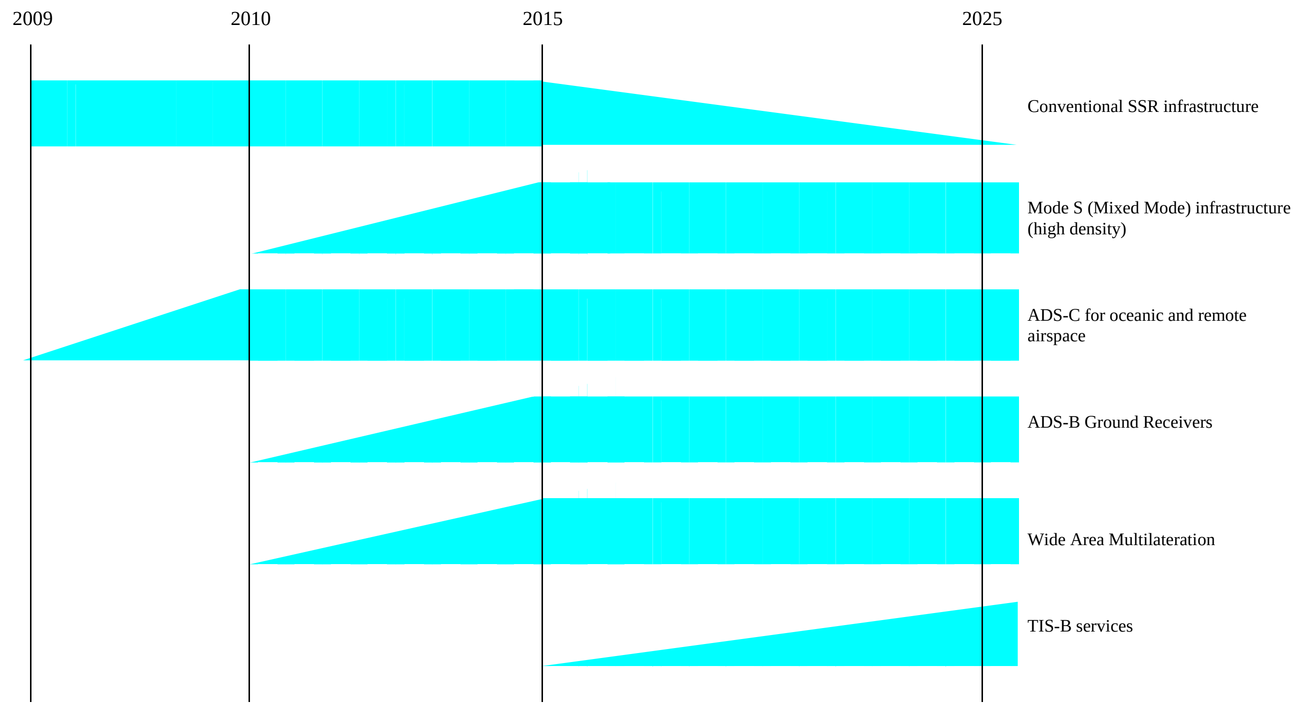
If aircraft are operating in airspace where the ADS-B Package I ground based surveillance applications are in use, then the avionics configuration will require changes to deliver the additional aircraft derived data required.

3.3.3 **Long term (until 2015-2025)**

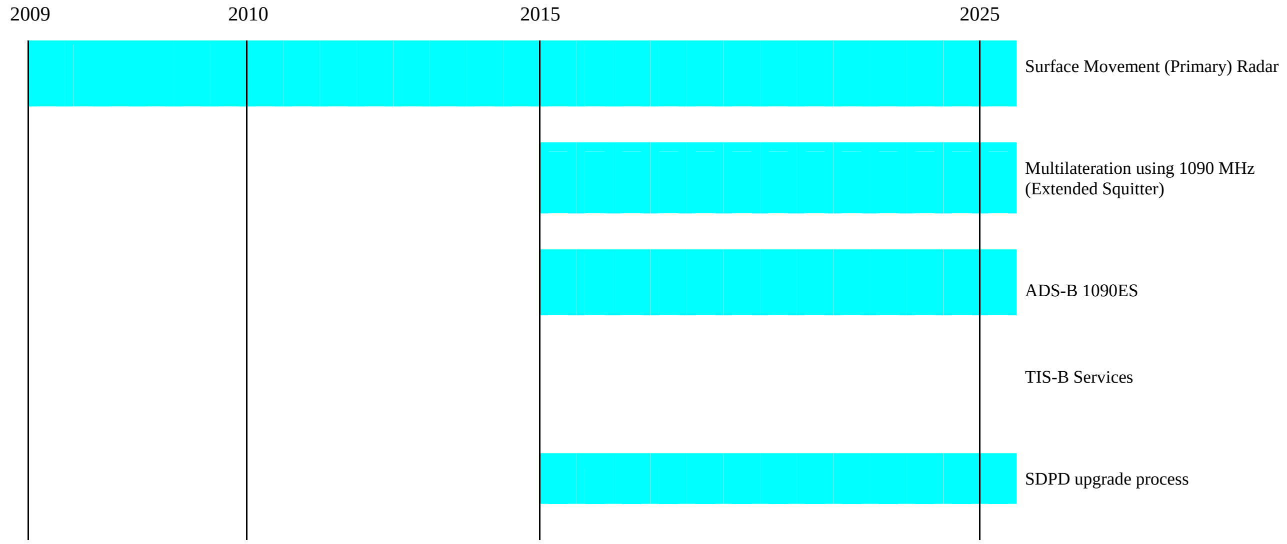
The move from ASAS spacing to ASAS separation and preferred routing may require a high integrity traffic situation picture, therefore the use of TIS-B may be required as well as the implementation of an airborne Surveillance Data Processing System (SDPS) to integrate ADS-B in and TIS-B for presentation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

3.4 **Surveillance Infrastructure Timeframe**

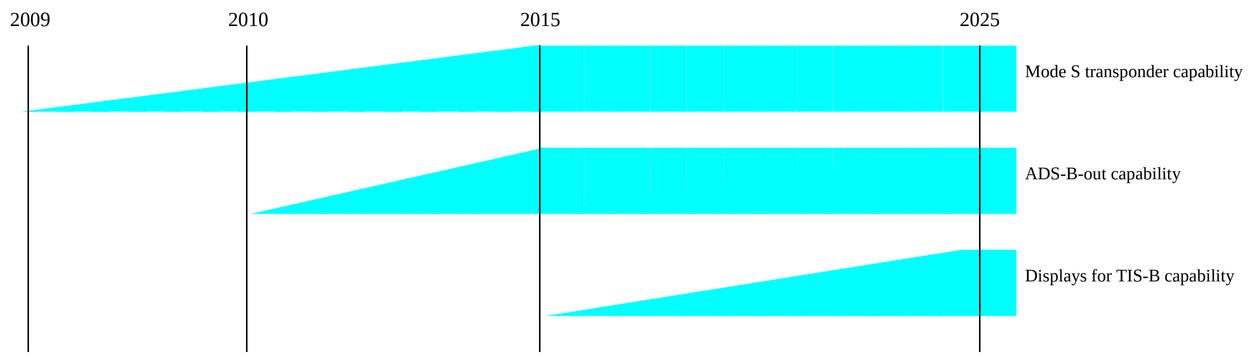
En Route and TMA Airspace



Aerodrome Operations



Aircraft Systems



3.5 Tentative Action Plan

3.5.1 Short term (until 2010)

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 Analysis, 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.

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. Therefore, a plan for data sharing should be established, based on bilateral agreements, aiming at a coordinated, harmonious and interoperable implementation of ADS-B.

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 continues to support the surveillance requirements.

3.5.2 **Medium term (2010-2015)**

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.

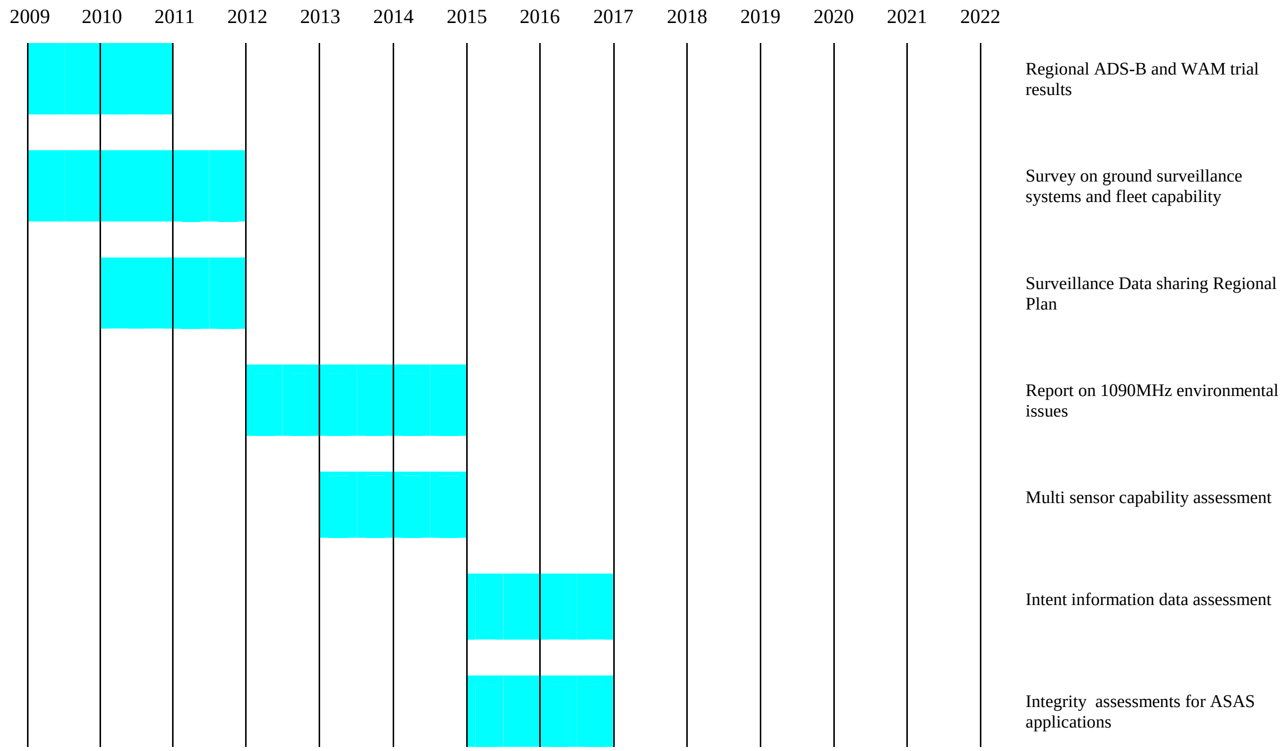
3.5.3 **Long term (until 2015-2025)**

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.

3.5.4 **Studies and Trials Timeframe**

Timeframe of the regional action plan



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 Commission
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
SSR	Secondary Surveillance Radar
TCAS	Traffic Collision Avoidance System
TIS-B	Traffic Information Service – Broadcast

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 (reference 6). 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.

APPENDIX G / APENDICE G

UPDATED ACTION PLAN FOR IMPLEMENTATION OF MEVA II AND REDDIG INTERCONNECTIONS
PLAN DE ACCIÓN ACTUALIZADO PARA LA IMPLANTACIÓN DE LAS INTERCONEXIONES MEVA II Y REDDIG

Date/Fecha: February/Febrero 2010

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
1	RFP Completion/Finalización del RFP	COCESNA	30-Apr-07	Completed / Finalizado
2	Required connections: / Conexiones requeridas: Aruba COCESNA Ecuador Colombia Peru Venezuela Brazil / Brasil Panama United States / Estados Unidos Jamaica Curacao / Curazao	MEVA II Service Provider and REDDIG Administration / Proveedor Servicio MEVA II y Administración REDDIG	30-Apr-07 / 30-Abr-07	Completed / Finalizado
3	Identification of Current Equipment / Identificación de Equipo Actual	MEVA II Service Provider and REDDIG Administration / Proveedor Servicio MEVA II y Administración REDDIG	28 Sep-07	Completed / Finalizado

Legend / Leyenda:
MoU: Memorandum of Understanding / Memorando de Entendimiento
RFP: Request for Tecnical and Econmic Proposal / Solicitud de Propuestas Técnicas y Económicas
SLA: Service Level Agreement / Acuerdo de Nivel de Servicio

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
4	Completion of SLA / Finalización de SLA	MEVA II Service Provider and REDDIG Administrator / Proveedor Servicio MEVA II y Administración REDDIG	25Mar-09	Completed/Finalizado El 25 de marzo de 2009 entre la OACI y el Proveedor de servicio de la MEVA II se firma del contrato para la implantación de la interconexión MEVA II / REDDIG/ The 25 March 2009 between ICAO and MEVA II Communications service provider is signed the contract for the implementation of MEVA II / REDDIG.
5	Review of RFP / Revisión de RFP	MEVA II and REDDIG Members / Miembros MEVA II y REDDIG	29 June -07/ 29 Junio 07	Completed / Finalizado The RFP was reviewed and approved by all MEVA II / REDDIG Member Administrations. El RFP fue revisado y aprobado por todas las Administraciones miembros de las redes MEVA II y REDDIG.
6	Proposals response / Respuesta de propuestas	MEVA II Service Provider and REDDIG Administration / Proveedor Servicio MEVA II y Administración REDDIG	26 Sep.-07	Completed / Finalizado The response for the RFP from the MEVA II Service Provider and REDDIG Administration was presented at the MR/5 Meeting. Las respuestas al RFP por parte del Proveedor de Servicio MEVA II y la Administración de la REDDIG se presentaron en la reunión MR/5.
7	Proposals review / Revisión de propuestas	Coordination meeting / Reunión de coordinación	5 Oct.-07	Completed / Finalizado The proposal was reviewed in the MR/5 Meeting. La propuesta se revisó en la reunión MR/5.

Item No.	Action / Acción		Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2		3	4	5
8	Focal Point nomination / Nombramiento Punto Focal	Send a letter to MEVA II / REDDIG Member Administrations / Envio carta a las Administraciones miembros de las redes MEVA II y REDDIG.	ICAO Regional Offices / Oficinas Regionales OACI	15 Oct. 07	Completed / Finalizado The ICAO Regional Offices sent to the States/Organization involved in the MEVAII REDDIG interconnection a letter in order to nominate focal points. Las oficinas regionales de la OACI enviaron una carta invitando los Estados/Organización involucrados en la interconexión la nominación de puntos focales.
		Focal point designation/ Designación punto focal	MEVA II and REDDIG Members involved / Miembros de MEVA II y REDDIG involucrados	30-Oct-07	Completed / Finalizado All the States/Organization members of MEVA II and REDDIG network involved in the interconnection nominated focal points. Todos los Estados/Organización miembros de la REDDIG y MEVA II involucrados en la interconexión nominaron puntos focales.
9	Application of MoU reviewed / Aplicación del MoU revisado		MEVA II / REDDIG Member Administrations / Administraciones miembros de las redes MEVA II y REDDIG	30-Oct-07	Completed / Finalizado States/Organization members of MEVA II REDDIG reviewed the MoU application. Los Estados/Organizaciones miembros de la MEVA II y REDDIG revisaron la aplicación del MoU.

<u>Legend / Leyenda</u>:
MoU: Memorandum of Understanding / Memorando de Entendimiento
RFP: Request for Tecnical and Econmic Proposal / Solicitud de Propuestas Técnicas y Económicas
SLA: Service Level Agreement / Acuerdo de Nivel de Servicio

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
10	Review and acceptance of equipment costs for the MEVA II / REDDIG interconnection by the REDDIG Member Administrations / Revisión y aceptación por parte de las Administraciones Miembros de la REDDIG sobre costo de equipamiento para la interconexión MEVA II / REDDIG	All the REDDIG Member States / Todos Estados miembros de REDDIG	30 Oct-07	Completed / Finalizado No comments were received. No se recibieron comentarios al respecto.
11	Review and acceptance of equipment costs for the MEVA II / REDDIG interconnection by the MEVA II Member Administrations involved / Revisión y aceptación por parte de las Administraciones Miembros de la MEVA II involucradas sobre costo de equipamiento para la interconexión MEVA II / REDDIG	Aruba, Curaçao, Jamaica, Panama, USA (Miami and Puerto Rico) and COCESNA / Aruba, Curaçao, Jamaica Panamá, USA (Miami y Puerto Rico) y COCESNA	30 Oct -07	Completed / Finalizado No comments were received. No se recibieron comentarios al respecto.
12	Review and acceptance of proposed recurrent costs for the MEVA II / REDDIG interconnection/ Revisión y aprobación costos recurrentes propuestos para la interconexión MEVA II REDDIG	MEVA II/ REDDIG Member Administrations involved / Administraciones Miembros de la MEVA II y REDDIG involucradas	30 Oct- 07	Completed / Finalizado No comments were received. No se recibieron comentarios al respecto.
13	Revised MoU Signature / Firma del MoU Revisado	MEVA II and REDDIG Members / Miembros MEVA II y REDDIG	30 Nov 07	Completed / Finalizado All the States REDDIG members signed the MoU reviewed. For MEVA II only Cuba, COCESNA and United States signed the MoU the rest of MEVA II States informed that they have reviewed and accepted the MoU Todos los Estados miembros de la REDDIG firmaron el MoU revisado. Para la MEVAII solamente Cuba, COCESNA y Estados Unidos firmaron el MoU el resto de los Estados miembros de la MEVA II informaron que habían revisado y aceptado el MoU revisado.

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
14	Review, approval and signing of contracts or contract amendments to carry out the MEVA II / REDDIG interconnection presented by the MEVA II Service Provider / Revisión, aprobación y firma de los contratos o enmienda de los mismos para llevar a cabo la interconexión MEVA II/REDDIG presentada a través del Proveedor de Servicio de la MEVA II	MEVA II Member Administrations involved and REDDIG Administration / Administraciones Miembros de la MEVA II involucradas y Administración REDDIG	25 Mar 2009	Completed/Finalizado The 25 March 2009 between ICAO and MEVA II communication service provider is signed the contract to carry out the MEVA II/ REDDIG interconnection. El 25 de marzo de 2009 se firma el contrato entre la OACI y el proveedor de servicios de comunicaciones de la MEVA II para llevar a cabo la interconexión MEVAII/REDDIG.
15	To ensure that all MEVA II and REDDIG nodes work with IS-IR Satellite, using Band C transponder with US/Latin America hemispheric beam and Co-Linear Vertical polarization / Asegurar que todos los nodos de la MEVA II y REDDIG operen en el satélite IS-1R, empleando transpondedores de banda C con haz hemisférico US/Latin America y polarización co-lineal vertical.	MEVA II Service Provider and REDDIG Administration/ Proveedor Servicio MEVA II/ Administración REDDIG	Nov -08	Completed / Finalizado In the month of November 2008 AGS proceeded to change the polarity from horizontal to vertical of the MEVA II nodes. With this implementation all the preliminary requirements for the interconnection were satisfied. En el mes de noviembre de 2008 AGS procedió a la implantación del cambio de polaridad de horizontal a vertical de los nodos de la MEVA II. Con esta implantación todos los requerimientos preliminares para la interconexión MEVAII / REDDIG están satisfechos.

<u>Legend / Leyenda</u>:
MoU: Memorandum of Understanding / Memorando de Entendimiento
RFP: Request for Tecnical and Econmic Proposal / Solicitud de Propuestas Técnicas y Económicas
SLA: Service Level Agreement / Acuerdo de Nivel de Servicio

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
16	Equipment and spare parts acquisition for MEVA II/REDDIG interconnection/ Adquisición de equipamiento y repuestos para la interconexión MEVA II / REDDIG.	REDDIG Administration and MEVA II involved Member Administrations / Administración de la REDDIG y Administraciones Miembros de la MEVA II involucradas	Mar- 09	Completed/ Finalizado ICAO acquired the equipments and cards required for REDDIG nodes involved in the MEVA REDDIG interconnection. Also acquired the equipments for the COCESNA MEVA II node. The rest of the States of MEVA II involved in the interconnection acquired the equipments and cards trough MEVA II service provider. OACI adquirió los equipos y tarjetas requeridas para la interconexión MEVA II REDDIG en los nodos REDDIG involucrados. También adquirió los equipos para el nodo MEVA II de COCESNA. El resto de los Estados MEVA II involucrados en la interconexión adquirió los equipos y tarjetas a través del proveedor de servicio de MEVA II.
17	Site survey for Bogota, Caracas , / Inspección sitio para Bogotá, Caracas	MEVA II Service Provider / Proveedor MEVA II y	Mayo - 09	Completed/Finalizado From 27 to 1 May 2009 AGS completed the Site Survey in the REDDIG nodes of Bogotá and Caracas. Desde el 27 al 1 de mayo de 2009 AGS completo la inspección en sitio en los nodos REDDIG de Bogotá y Caracas.

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
18	Site Survey for Tegucigalpa Honduras	REDDIG Administration/ Administración REDDIG	April - 2010	The site survey in COCESNA MEVAII node will be made once the ICAO COCESNA project for MEVA II REDDIG interconnection will be signed (end of March 2010) La inspección en sitio en el nodo MEVAII de COCESNA se realizara una vez que se firme el proyecto entre la OACI y COCESNA para la interconexión MEVAII REDDIG (Finales de marzo de 2010)
19	Site preparation for equipment installation for MEVA II / REDDIG interconnection / Preparación de los sitios para albergar equipamiento para la interconexión MEVA II / REDDIG	Colombia, Venezuela and/y COCESNA	Jun-09	Completed/Finalizado

<u>Legend / Leyenda</u>:
MoU: Memorandum of Understanding / Memorando de Entendimiento
RFP: Request for Tecnical and Econmic Proposal / Solicitud de Propuestas Técnicas y Económicas
SLA: Service Level Agreement / Acuerdo de Nivel de Servicio

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
20	Delivery of purchased equipment at the required sites. / Entrega de equipamiento adquirido en los sitios requeridos	MEVA II Service Provider / Proveedor de Servicio MEVA II REDDIG Administration / Administración REDDIG	Jul-09 Apr/Abr-2010	Completed/Finalizado The equipments necessary for the MEVA II REDDIG interconnection in REDDIG nodes were acquired by ICAO , reviewed by MEVA II service provider and delivered to the REDDIG nodes involved in the MEVA II REDDIG interconnection The equipment for MEVA II nodes involved in the interconnection except COCESNA were acquired and delivered by MEVA II service provider to the respective nodes. Los equipos para la interconexión MEVA II REDDIG en los nodos REDDIG fueron adquiridos por OACI, revisados por el proveedor de servicio de MEVA II y enviados a los nodos REDDIG involucrados en la interconexión MEVAII/REDDIG. Los equipos para los nodos MEVA II involucrados en la interconexión excepto COCESNA fueron adquiridos y entregados por el proveedor de servicio MEVA II a los respectivos nodos. The equipment for COCESNA MEVAII node was acquired and reviewed by REDDIG Administration. The equipments will be delivered to COCESNA once the ICAO and COCESNA signs the project for the interconnection of COCESNA MEVA II node with REDDIG. Los equipos para el nodo MEVAII de COCESNA fueron adquiridos y revisados por la administración de la REDDIG . Los equipos serán entregados a COCESNA una vez que entre la OACI y COCESNA se firme el proyecto de interconexión del nodo MEVAII de COCESNA con la REDDIG.

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
21	Equipment installation / Instalación equipamiento	MEVA II Service Provider and REDDIG Administration / Proveedor de Servicio MEVA II y Administración REDDIG	March 2010 Apr/Abr-2010	MEVAII service provider started the interconnection works in Bogota REDDIG node the 8th February 2010.The installation work was interrupted due software problem configuration in the MEVAII MODEM At this respect MEVAII service provider re-programmed the installation date for the first week of March 2010. El proveedor de servicio MEVA II inicio los trabajos de interconexión en el nodo REDDIG de Bogotá el 8 de febrero de 2010. Los trabajos de instalación se interrumpieron debido a que el MODEM MEVA II a instalarse en Bogotá presentaba problemas de configuración de software. A este respecto el proveedor de servicio MEVA II re programo la fecha de instalación para la primera semana de marzo de 2010. The equipment installation in COCESNA MEVA II network will be made once the once the ICAO COCESNA project for MEVA II REDDIG interconnection will be signed. La instalación de los equipos en el nodo MEVA II de COCESNA se hará una vez que se firme el proyecto entre la OACI y COCENA para la interconexión.

Legend / Leyenda:
MoU: Memorandum of Understanding / Memorando de Entendimiento
RFP: Request for Tecnical and Econmic Proposal / Solicitud de Propuestas Técnicas y Económicas
SLA: Service Level Agreement / Acuerdo de Nivel de Servicio

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
22	Satellite line-up, configuration of site equipment and NCC for the interconnection/ Line-up satelital, configuración equipamiento en sitio y NCC para interconexión	MEVA II Service Provider and REDDIG Administration / Proveedor de Servicio MEVA II y Administración REDDIG	Mar - 2010 Apr/Abri-2010	For the installation of the interconnection in Bogota and Caracas Para la instalación de la interconexión en Bogotá y Caracas For the installation of the interconnection in the COCESNA MEVAII node. Para la instalación de la interconexión en en el nodo MEVA II de COCESNA
23	End-to-end trials for voice and data circuits / Pruebas de extremos a extremos para los circuitos de voz y datos	MEVAII Service Provider and REDDIG Administration / Proveedor de Servicio MEVA II y Administración REDDIG	Apr/Abr-2010 Apr/Abr-2010	For the voice and data circuit specified in the interconnection of REDDIG nodes of Bogota and Caracas with MEVA II network, contract between ICAO and MEVA II service provider (N° 22500187). Para los circuitos de voz y datos especificados en la interconexión de los nodos REDDIG de Bogotá y Caracas con la red MEVA II , contrato entre la OACI y el proveedor de servicio MEVA II (N° 22500187). For the voice circuit specified in the interconnection of COCESNA MEVA II node with REDDIG network, project between ICAO and COCESNA (RLA/09/901). Para los circuitos de voz especificados en la interconexión del nodo MEVA II de COCESNA con la red REDDIG, proyecto entre la OACI y COCESNA (RLA/09/901).

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
24	System Performance Evaluation / Evaluación de la performance del sistema	MEVA II Service Provider and REDDIG Administration / Proveedor de Servicio MEVA II y Administración REDDIG	Abr/Apr- 2010 Abr/Apr- 2010	Interconnection of REDDIG nodes of Bogota and Caracas with MEVA II network, contract between ICAO and MEVA II service provider (N° 22500187). Interconexión de los nodos REDDIG de Bogotá y Caracas con la red MEVA II, contrato entre la OACI y el proveedor de servicio MEVA II (.N° 22500187). Interconnection of COCESNA MEVA II node with REDDIG network, project between ICAO and COCESNA (RLA/09/901). Interconexión del nodo MEVA II de COCESNA con la red REDDIG, proyecto entre la OACI y COCESNA (RLA/09/901).

Legend / Leyenda:
MoU: Memorandum of Understanding / Memorando de Entendimiento
RFP: Request for Tecnical and Econmic Proposal / Solicitud de Propuestas Técnicas y Económicas
SLA: Service Level Agreement / Acuerdo de Nivel de Servicio

Item No.	Action / Acción	Responsible / Responsible	Completion Date / Fecha de Finalización	Status- Encountered Difficulties / Estado-Dificultades encontradas
1	2	3	4	5
25	Service acceptance / Aceptación de los servicios /	MEVA II / REDDIG Member Administrations / Administraciones miembros de las redes MEVA II y REDDIG	Abr/Apr- 2010 Abr/Apr- 2010	Interconnection of REDDIG nodes of Bogota and Caracas with MEVA II network, contract between ICAO and MEVA II service provider (N° 22500187). Interconexión de los nodos REDDIG de Bogotá y Caracas con la red MEVA II, contrato entre la OACI y el proveedor de servicio MEVA II (N° 22500187). Interconnection of COCESNA MEVA II node with REDDIG network, project between ICAO and COCESNA (RLA/09/901). Interconexión del nodo MEVA II de COCESNA con la red REDDIG, proyecto entre la OACI y COCESNA (RLA/09/901).
26	MEVA II / REDDIG Interconnection Implementation / Implantación de la interconexión MEVA II / REDDIG	MEVA II / REDDIG Member Administrations, MEVA II Service Provider and REDDIG Administrator / Administraciones miembros de las redes MEVA II y REDDIG, Proveedor Servicio MEVA II y Administración REDDIG	Abr/Apr- 2010 Abr/Apr- 2010	Interconnection of REDDIG nodes of Bogota and Caracas with MEVA II network, contract between ICAO and MEVA II service provider (N° 22500187). Interconexión de los nodos REDDIG de Bogotá y Caracas con la red MEVA II, contrato entre la OACI y el proveedor de servicio MEVA II (N° 22500187). Interconnection of COCESNA MEVA II node with REDDIG network, project between ICAO and COCESNA (RLA/09/901). Interconexión del nodo MEVA II de COCESNA con la red REDDIG, proyecto entre la OACI y COCESNA (RLA/09/901).

APPENDIX H / APÉNDICE H

PUNTOS FOCALES PARA COORDINAR LA IMPLANTACIÓN DEL PLAN DE ACCIÓN PARA LA INTERCONEXIÓN MEVA II/REDDIG

FOCAL POINTS FOR COORDINATING THE IMPLEMENTATION OF THE ACTION PLAN FOR MEVA II/REDDIG INTERCONNECTION

ESTADO ORGANIZACION/ STATE ORGANIZATION	NOMBRE-TITULO/ NAME-TITLE	DATOS DE CONTACTO/ CONTACT INFORMATION
ARUBA	**Joselito Correia de Andrade** Actg Chief CNS/ATM Systems	Department of Civil Aviation of Aruba Sabana Berde 73B Tel +297 583 2665 / +297 582 4330, Ext 223 Fax +297 582 3038 Email Joselito.CorreiadeAndrade@aruba.gov.aw
BRASIL/ BRAZIL	**Dalmo Jose Braga Paim Athayde** Oficial CNS	CINDACTA IV Av. Do Turismo ,S/N Taruma Manaos –AM ,Brasil Tel +55 92 3652 5568 Fax +55 92 3652 5501 Email tel@cindacta4.decea.gov.br
	Jorge Mauricio Motta Coordinador Técnico REDDIG/ REDDIG Techanical Coordinator	CINDACTA IV Av. Do Turismo sin Taruma Manaus – AM, Brasil Tel +55 92 3652 5536 Fax +55 92 3652 5501 Email tten@cindacta4.decea.gov.br
	Alessandro Stefson Mamede Alves Coordiador Técnico REDDIG/REDDIG Technical Coordinator	CINDACTA IV Av. Do Turismo sin Taruma Manaus – AM, Brasil Tel +55 92 3652 5470 Fax +55 92 3652 5501 Email ttaa@cindacta4.decea.gov.br
	Jose Izidro Apolinario Oficial CNS	DECEA Av General Justo,160 Castelo, Rio de Janeiro,Brasil Tel +55 21 2101 6225 Fax +55 21 2101 6219 Email dcte6@decea.gov.br
COLOMBIA	**Sergio Paris** Asesor del Director de la UAEAC/ Adviser to the UAEAC Director	Unidad Administrativa Especial de Aeronáutica Civil (UAEAC) Dirección de Telecomunicaciones Aeropuerto Internacional El Dorado Tel +57 1 266 3672 Fax +57 1 222 3486

ESTADO ORGANIZACION/ STATE ORGANIZATION	NOMBRE-TITULO/ NAME-TITLE	DATOS DE CONTACTO/ CONTACT INFORMATION
CURAZAO	**Micilia Albertus-Verboom** Director General	Netherlands Antilles Air Traffic Control (NAATC) Seru Mahuma z/n Curaçao Netherlands Antilles Tel + 599 9 839 3506 Fax + 599 9 868 3012 E-mail m.albertus-verboom@naatc.an
	Cedric D. Balentien CNS Manager	Netherlands Antilles Air Traffic Control (NAATC) Curaçao Netherlands Antilles Tel + 599 9 839 3512 Fax + 599 9 868 3012 E-mail c.balentien@naatc.an
ECUADOR	**Raúl Avellán Oña** Asuntos técnicos:/Technical matter **Aida Justina Moreno Gómez** Jefe Comunicaciones Satelitales RI – Asuntos Administrativos/Chief RI satellite communications	Aeropuerto José Joaquín Olmedo Guayaquil, Ecuador Tel +593 42 692829 Cel +593 84 362441 REDDIG 2308 / 2309 Email ravellan1@yahoo.com Dirección General de Aviación Civil Cerro Mojas, Edificio Servicio para la Navegación Aérea Quito, Ecuador Tel + 593 260 1434 Fax + 593 260 1434 E-mail aida_moreno@dgac.gov.ec; aidamg@hotmail.com
Estados Unidos/United States	**Dulce Roses** Program Manager, International Telecommunications	Traffic Organization – Technical Support Center 7500 NW 58th St. Miami, FL 33166 United States Tel.: + 305 716 1830 Fax: + 305 716 1831 E-mail dulce.roses@faa.gov
JAMAICA	**Derrick Grant** CNS Engineer	Jamaica Civil Aviation Authority 4 Winchester Road Kingston 10, Jamaica Tel + 876 960 3965 Fax + 876 960 8209 E-mail dgrant@jcaa.gov.jm
PANAMA	**Daniel De Ávila H.** Técnico Comunicaciones Aeronáuticas	Autoridad Aeronáutica Civil – AAC Av. Ascanio Villalaz, Edificio 611, Centro de Control de Tránsito Aéreo, Apartado 5006, 8-72493 Panamá Panamá Tel +507 501 9865 Fax +507 501 9879 E-mail: deavila@aeronautica.gob.pa
PERÚ/PERU	**Jorge García Villalobos** Jefe Equipo Conmutación Electrónica	Aeropuerto Internacional Jorge Chávez Av. Elmer Faucett s/n

ESTADO ORGANIZACION/ STATE ORGANIZATION	NOMBRE-TITULO/ NAME-TITLE	DATOS DE CONTACTO/ CONTACT INFORMATION
	CORPAC S.A.	Callao 1, Perú Tel: +511 414-1432 Fax: +511 414-1450 E-mail jgarcia@corpac.gob.pe
	José Rubira Chauca	Aeropuerto Internacional Jorge Chávez Av. Elmer Faucett s/n Callao 1, Perú Tel +511 630-1196 Fax E-mail jrubira@corpac.gob.pe
VENEZUELA	**Luis E. Escobar** Jefe Telecomunicaciones Aeropuerto Maiquetía/Chief Telecommunications, Maiquetia Airport	Aeropuerto Simón Bolívar, Edif. ATC, Piso 2 Maiquetía, Venezuela Tel +58 212 3552143 Fax +58 212 3551412 Mail scoguil5@cantv.net l.escobar@inac.gob.ve
	Wilton R. Linarez Gerente General de la Oficina de Tecnología de la Información “OTI”/ General Manager Information Technology Office	Instituto Nacional de Aeronáutica Civil (INAC) Altamira Sur, Torre Británica, Piso 2 Caracas, Venezuela Tel +58 212 2774403 Fax +58 212 2774403 E-mail w.linarez@inac.gob.ve
COCESNA	**Roger Perez** Gerente Estación Honduras /Honduras General Manager	COCESNA Apartado Postal No. 660 Tegucigalpa, D. C., Honduras, C. A. Tel + 504 234 3360 ext. 1461 Fax + 504 234 3682 E-mail rperez@cocesna.org

APPENDIX I / APENDICE I

POINT-OF-CONTACT (PoCs) TO COORDINATE MATTERS CONCERNING WRC-2012/ PUNTO DE CONTACTO (PoCs) PARA COORDINAR ASUNTOS CONCERNINENTES A LA CMR-2012

POINT-OF-CONTACT (PoCs) TO COORDINATE MATTERS CONCERNING WRC-2012/ PUNTO DE CONTACTO (PoCs) PARA COORDINAR ASUNTOS CONCERNINENTES A LA CMR-2012				
STATE / ESTADO	**DIRECTOR**	**ADDRESS / DIRECCION**	**E-MAIL**	**TEL / FAX:**
CAR REGION REGION CAR				
Aruba				
Bahamas	**Mr. Hilliard Walker** Chief Operations Officer	Bahamas Civil Aviation Box N975 Air Traffic Services Nassau Bahamas	Hilliard_walker@hotmail.com	T + 242-377-2004 T + 242-377-2008 F + 242-326-3591
Barbados	**Mitchinson H. Beckles** Technical Officer, Training & Systems	Building 4 Grantley Adams Industrial Park Grantley Adams International Airport Christ Church, Barbados, BB 17089	civilav@sunbeach.net	T + 1246 428 6667 F + 1246 428 2539
Belize	Luis Ake/Ernest Arzu		earzu@cocesna.org	
Canada				
Costa Rica	**Steve Solano Bolaños** Director de Navegación Aérea	Dirección de Navegación Aérea Apartado Postal 5026-1000 San José, Costa Rica	ssolano@dgac.go.cr	T/F + 506 2231 4924 T + 506 2231 3666 ext 214 ó 128
Cuba	**Ing. Carlos Pérez Saavedra** Especialista Principal CNS	Dirección de Aeronavegación Instituto de Aeronáutica Civil de Cuba Calle 23 No. 64 Vedado, Plaza, La Habana, Cuba	carlos.saavedra@iacc.avianet.cu	T + 537 838 1121 T + 537 838 4949 ext 3003
ECCAA (Representing Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, Anguilla)	**Donald McPhail** Director of Air Navigation Services	Eastern Caribbean Civil Aviation Authority Corner Factory Rd. & Nugent Ave. P.O. Box 1130 St. John's, Antigua	dmcphail@eccaa.aero	T + 268 462 0000 F + 268 462 0082
El Salvador	Mauricio Rodas			
French Antilles	Jean-Jacques Deschamps			
Guatemala	Rolando Giron			
Haiti	Jacques Boursiquot			
Honduras	Julio Oyuela			
Jamaica	Derrick Grant			
Mexico	**Ing. Sergio A. Pérez Rodríguez** Director de Ingeniería		sprodrig@sct.gob.mx	T + 52 55 5786 5525 F + 52 55 2598 0063
Netherlands Antilles	Jacques Larsten			
Nicaragua	**Luis Adolfo Aleman** Inspector CNS	Instituto Nicaragüense de Aeronáutica Civil (INAC) Km. 11.5 Carretera Norte Managua, Nicaragua	aeronav@inac.gob.ni	T + 2276 8580 ext 1150 T + 505 8408 2800 F + 505 2276 8580
	Saiman Morales Gutiérrez Jefe Departamento ATS		atm@inac.gob.ni	T + 2276 8580 ext 1150 T + 505 8695 4514 F + 505 2276 8580
República Dominicana	Elvis Collado			
Trinidad and Tobago	Veronica Ramdath			
United Kingdom	James Prideaux	Assistant Manager Caribbean Air Safety Support International	james.prideaux@caribairsafety.aero	T +1284 5419413 (C) T +1284 4957143 (O) F +1284 4957138
UNITED KINGDOM TERRITORIES:				
Anguilla	James Prideaux	Assistant Manager Caribbean Air Safety Support International	james.prideaux@caribairsafety.aero	T +1284 5419413 (C) T +1284 4957143 (O) F +1284 4957138
Bermuda				

POINT-OF-CONTACT (PoCs) TO COORDINATE MATTERS CONCERNING WRC-2012/ PUNTO DE CONTACTO (PoCs) PARA COORDINAR ASUNTOS CONCERNINENTES A LA CMR-2012				
STATE / ESTADO	**DIRECTOR**	**ADDRESS / DIRECCION**	**E-MAIL**	**TEL / FAX:**
CAR REGION REGION CAR				
British Virgin Islands	James Prideaux	Assistant Manager Caribbean Air Safety Support International	james.prideaux@caribairsafety.aero	T +1284 5419413 (C) T +1284 4957143 (O) F +1284 4957138
Cayman Islands	Wayne Dacosta			
Montserrat *	James Prideaux	Assistant Manager Caribbean Air Safety Support International	james.prideaux@caribairsafety.aero	T +1284 5419413 (C) T +1284 4957143 (O) F +1284 4957138
Turks and Caicos	Emmanuel Rigby at	Turks & Caicos Islands Airports Authority Providenciales Turks & Caicos Islands	emmanuelrigby@tciairports.com	T + 649-941-8692(W) T + 649-331-7099(C) F + 649-941-5996
United States	**Robert Frazier** Manager, Spectrum Planning and International Office	Federal Aviation Administration 800 Independence Ave. S.W. AJW-64, Room 715 Washington D.C 20591	robert.frazier@faa.gov	Not provided
COCESNA	**Roger Alberto Pérez** Gerente de Estación Honduras	Apartado Postal 660 Tegucigalpa, MDC, Honduras Centroamérica	rperez@cocesna.org	T + 504 234 3360 ext 1461 F + 504 234 3682

SAM REGION / REGION SAM				
STATE / ESTADO	**DIRECTOR**	**ADDRESS / DIRECCION**	**E-MAIL**	**TEL / FAX:**
ARGENTINA	**Alfredo Iacono**	Administración Nacional de Aviación Civil (ANAC) Pedro Zanni 250 Edificio Cóndor Oficina 1072 (1009) Buenos Aires, Argentina	fabianiacono@hotmail.com	T + 54 11 4317 6324
BOLIVIA	**Jaime Yuri Alvarez**	Dirección General de Aeronáutica Civil (DGAC) Edif. Palacio de Comunicaciones Av. Mariscal Santa Cruz No. 1278, piso 4to. Casilla No. 9360 La Paz, Bolivia	jalvarez@dgac.dgac.gov.bo	T + 591 2 237 4142
BRASIL	**Eduardo Miguel Soares** **Geandro Luiz de Mattos**	Departamento de Controle do Espaço Aéreo (DECEA) Av. Gral. Justo 160, 2º Andar Centro Río de Janeiro RJ. CEP, Brasil	pln1@decea.gov.br dcte3@decea.gov.br	T + 55 21 2101-6464 T + 55 21 2010-6213
CHILE	**Ricardo Bordalí** Planificación de Navegación Aérea	Dirección General de Aeronáutica Civil (DGAC) Av.Miguel Claro N° 1314 Clasificador 3 – Correo 9, Providencia Santiago, Chile	rbordali@dgac.cl	T + 56 2 439-2541
COLOMBIA				
ECUADOR	Alessandra Contreras	Dirección General de Aviación Civil (DGAC) Edificio Los Andes Buenos Aires 149 y Av. 10 de Agosto Apartado 17-01-2077 Quito, Ecuador	director@dgac.gov.ec	T + 5932 2223179 F + 5932 2563995
GUYANA				
FRENCH GUIANA				
PANAMA				

PARAGUAY	**Gustavo Prieto** Jefe Departamento CNS	Dirección Nacional de Aeronáutica Civil (DINAC) Edificio Ministerio de Defensa Nacional, 2o. Piso Mcal. López N° 1164 Asunción, Paraguay	cns@dinac.gov.py prieto.gustavo@gmail.com	T + 595 21 205 365
PERU	**Paulo Vila Millones** Inspector de Navegación Aérea	Dirección General de Aeronáutica Civil Ministerio de Transportes y Comunicaciones Jr. Zorritos 1203 Lima 1, Perú	pvila@mtc.gob.pe	T + 511 615 7800, Ext 1576 F + 511 615 7881
SURINAME				
URUGUAY				
VENEZUELA				

APPENDIX J

STRATEGY FOR THE IMPLEMENTATION OF AMENDMENT 1 TO THE 15TH EDITION OF THE ICAO PANS-ATM (DOCUMENT 4444) IN THE CAR/SAM REGIONS

TABLE OF CONTENTS

1. Objective

The purpose of this document is to establish the CAR/SAM Regions' strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Doc 4444), pursuant to Conclusion 15/35 of GREPECAS.

2. General considerations

ICAO, taking into consideration that:

- Dynamic management of information will provide the most appropriate and integrated vision of ATM status in historical terms--past, present, and planned or future---and will serve as a basis for decision-making by the whole ATM community;

- The *Global Air Traffic Management Operational Concept* (Doc 9854) requires information management actions to support ATM operations with accurate, quality, and timely information; and

- ATM requirement N^{o} 87 of the *Manual on Air Traffic Management System Requirements* (Doc 9882) defines that 4-D paths will be used in traffic synchronisation applications, with a view to attaining the performance objectives of the ATM system. It also clarifies that automation in both "ground" and "air" applications will be fully used to create an efficient and safe air traffic flow in all flight phases.

Informed the States, through letter AN13/2.1-08/50 of 25 June 2008, about the publication of Amendment 1 to Doc. 4444 (PANS-ATM), aimed at updating the ICAO flight plan (FPL) form to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, while taking into account compatibility with existing systems, human factors, training, cost, and transition aspects.

GREPECAS/15, when assessing the establishment of the new CNS/ATM Subgroup and its terms of reference and work programme, reviewed the new flight plan model. In this regard, considering that a CAR/SAM regional strategy will need to be established for its implementation, it formulated Conclusion 15/35 "*Implementation of the new ICAO flight plan model*" requesting States to adopt the necessary measures to prepare for the transition, and also requesting the CNS/ATM//SG to establish a contributory body to develop such transition strategy.

A previous analysis carried out in some CAR/SAM States has remarked that the implementation of the new flight plan format will impact on, among other systems, the flight plan dealing subsystems, the interface communications with other systems, in the screen control human-machine interface (IHM), and in the recording and re-visualization subsystems.

In view of the above, an initial plan has been developed, together with a description of the strategy for the implementation of said amendment.

3. Principles

In preparing this document, the following aspects have been considered:

1. The sovereign will of the States;

2. It is a guide for CAR/SAM States to develop their action plans for the implementation of the contents of Amendment 1 to Doc. 4444.

4. Scope

This document applies to all CAR/SAM States, Territories and International Organizations, specifically to all air navigation service providers and airspace users.

5. Reference documents

This strategy follows ICAO recommendations, as contained in the following documents:

a) ICAO PANS-ATM, 15th Edition (Doc 4444)

b) Amendment 1 to the 15th Edition of Doc 4444;

c) Directives for the incorporation of flight plan information, pursuant to Amendment 1 to the Procedures for air navigation services - Air traffic management, 15th edition (PANS-ATM, Doc 4444)(State letter AN 13/2.1-09/9 of 6 February 2009); and

d) GREPECAS 15 final report.

6. Analysis

6.1. Amendment 1 to the 15th edition of Doc 4444;

ICAO considered that, in order to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, the flight plan forms need to be updated.

In this regard, it published Amendment 1 to PANS-ATM, Doc 4444 - 15th Edition, which contains, basically, the following changes:

1. Flight plan

   a. Flight plan form: operators and air traffic service units should comply with the restrictions established in aeronautical information publications (AIPs);

   b. Filing of flight plan: changes in the deadlines for filing flight plans;

   c. Item 7: Aircraft identification: use of alphanumeric characters;

   d. Item 8: Flight rules: specification of one or more items of change in flight rules;

   e. Item 10: Equipment: changes in the designation of equipment and capabilities

f. Item 13: Aerodrome of departure and time

g. Item 15: Route

h. Item 16: Aerodrome of destination and total estimated duration, alternate destination aerodromes

i. Item 18: Other data

2. Messages from air traffic services

a. Composition of CHG, CNL, DLA, DEP, RQP and RQS messages

6.2. Implementation directives

In Letter AN 13/2.1-09/9, dated 6 February 2009, ICAO defines the directives for the incorporation of flight plan information pursuant to Amendment 1 to the Procedures for air traffic services.

In general, ICAO highlights that the changes have significant repercussions for ANSP flight data processing systems that check and accept flight plans and related messages, use flight plan data from displays as a reference for controllers, use data for ANSP automation, and facilitate communications among ANSPs during flight, and also have consequences for airspace users.

Although a date has not been established for the implementation of flight planning changes, the transition is expected to begin on 25 June 2008 and finish on 15 November 2012.

It also recognises that the changes will be applied according to timetables specific to each ANSP and airspace user, based on their own needs, but there shall be some coordination.

Finally, it stresses that all those involved should be in a position to submit and process flight information in keeping with Amendment 1 to the PANS-ATM by 15 November 2012.

Some considerations regarding the planning environment follow:

1. EXISTING means the existing flight planning formats and ATS messages defined in the current version of the PANS-ATM;

2. NEW means the flight planning formats and ATS messages specified in Amendment 1 to the PANS-ATM;

3. The ATM system shall support simultaneously the EXISTING and NEW information for some period of time, in order to have time to deal with individual performance cases;

4. Amendment 1 does not change the filing of flight plans through different means (individual filing of flight plans before each ANSP, filing of flight plans at one location and then the ATM system distributes them), but the transition to the implementation of Amendment 1 might entail some requirements during the transition period;

5. The Amendment makes changes to the content of flight plan messages exchanged between ANSPs.

A summary of the contents of ICAO directives follows:

Directriz 1. Recommends that ANSPs be capable of operating with the two types of flight plan information, EXISTING and NEW, during the transition period. ANSPs are not required to accept and process EXISTING data after 15 November 2012. It applies to cases in which some ANSPs and/or airspace users do not implement flight plan changes until the end of the transition period.

Directriz 2. Regional planning and implementation groups are encouraged to plan and publish the changes sufficiently in advance to the date of application. It considers that transition plans should take into account the fact that it is possible that airspace users will not be able to use the new opportunities offered by the NEW information until such time that the ANSPs have made the transition and, even then, the use of the NEW information could be limited in its application if flights continue to involve ANSPs that have not made the transition yet.

Directriz 3. Clarifies that airspace users will determine whether they will submit NEW or EXISTING information to the ANSP during the transition period and after the ANSP has notified that it can accept the NEW information.

Directriz 4. In the event that not all ANSPs have made the transition to the NEW information, airspace users must make sure that the EXISTING information is submitted to the ANSPs that have not made the transition yet. It stresses the concern that ANSPs that use EXISTING information might misinterpret and reject the information submitted by airspace users more than 24 hours before the flight, as well as the case in which ANSPs that use the NEW information will not be in a position to transmit essential coordination to the ANSPs that use the EXISTING information.

Directriz 5. Informs that ICAO will maintain a website containing the list of capabilities of each ANSP to accept EXISTING or NEW information. Each ANSP will communicate to the respective ICAO Regional Offices, as soon as possible, its capability of accepting the NEW information.

Directriz 6. To supplement Directive 4, it is noted that the ANSPs that accept the NEW information could translate flight information into EXISTING information for purposes of coordination with adjacent ANSPs that have not made the transition.

6.3. Current scenario in the CAR/SAM Regions

Currently, the CAR/SAM Regions show different levels of technological evolution in terms of ATM automation, which can be classified into the following groups:

- States that have automated systems;
- States that have ATM automated systems and are in the process of updating them;
- States that do not have ATM automated systems, but are in the phase of implementing them in the short term;
- States that do not have ATM automated systems and no short- or medium-term plans to purchase them.

The implementation strategy must take into account the different degrees of technology evolution in each Region.

The main means used for the transmission of flight plans in the Region is the AFTN, which is in the process of transition to the AMHS system. It is expected that, by 2015, practically all CAR/SAM States will have the AMHS system installed.

6.4. Impact

Based on the changes defined by ICAO, on the directives for the implementation of these changes and on the current scenario of the CAR/SAM Regions, a macro analysis is made of the impact on ATM systems, whether automated or not, as well as on data communication systems, both at the technical and operational level.

6.4.1. Technical impact

For States that do not have ATM automated systems, the changes in the new flight plan format would only affect data communication systems based on the AFTN or the AMHS, basically associated to the human-machine interface (IMH) at the system terminals available at AIS offices and other specific locations for the entry of flight plans.

It must be noted that changes in the flight plan format involve the introduction of more options for filling the boxes in the form, and this could imply more errors in the generation of messages from terminals, which do not have the capability of checking data consistency, only message syntax.

It must be noted that these changes in the flight plan form introduce many options that can increase the likelihood of errors when completing it.

In States that have ATM automated systems, changes have a significant technical impact, and it will be necessary, at least, to make adjustments in the sub-systems dealing with flight plan processing, communication interface with other systems, recording and re-display, and in the HMI of control displays.

Such adjustments must take into account, at least, the following aspects:

- The incorporation of all the changes contained in Amendment 1 and described in item 6.1 of this document;

- The provision to the air traffic controller of all the information required for air traffic planning and management, including the alerts of aircraft capability changes;

- Enabling the correct transmission of flight plan information, EXISTING of NEW, to all the control centres involved;

- A clear definition of box sizes and their respective sub-divisions, as well as data sequencing (for example, the sequence for the inclusion of data in Box 10);

- Including the updating of all the technical documentation of the system; and

- Early testing to validate the changes.

Consequently, the effort of modifying these systems must be considered, also taking into account the difficulties inherent to technological obsolescence and insufficient technical training of maintenance personnel, which may cause additional financial expenditures due to the need to hire third parties, and a higher risk of failure.

For States that are in the process of purchasing new automated systems, whether or not for changing the existing systems, the impact will be on the specification of such systems, which must be suitable to process the changes defined in the amendment.

Another important aspect is that ICAO considers a period of transition, in which ANSPs must be capable of processing EXISTING and NEW information, which implies making adjustments to the software so that it can recognise what format is being used.

6.4.2. Operational impact

The changes have a direct impact on operational personnel, especially air traffic controllers and flight plan operators.

However, many variables need to be considered, as well as the relationships between the data in the different boxes of the FPL (for example, boxes 10 and 18), which may change depending on aircraft status.

This impact is reduced if the ATM automated system can provide the air traffic controller with the information required for air traffic planning, and send alerts whenever there is a change in the scenario with respect to the data declared in the flight plan.

Consideration should also be given to the operational difficulty that will exist during the transition period, when it must be possible to operate with the two types of information: EXISTING and NEW

It is also necessary to clearly and formally define those aspects that are not totally defined in Amendment 1 and in the directives; for example, the use of item COM/NAV, in Box 10, where the letter S represents VHF RTF, VOR or ILS standard equipment, without making reference to NDB.

In order to mitigate the impact, a significant amount of training must be provided to the personnel on both the use of the new resources of the automated system and the manual processing of flight plan data, as well as on the adjustment of operational models and the clear definition of controversial issues.

7. Implementation strategy

7.1. Critical criteria

The following aspects must be taken into account for the implementation of Amendment 1 in the CAR/SAM Regions:

- Make sure that, by 15 November 2012, all States and airspace users implement all the changes contained in Amendment 1, and not just some selected aspects;

- States that do not fully implement the amendment will be obliged to publish the non-conformities in their AIPs as “SIGNIFICANT DIFFERENCE” before 15 November 2012. Likewise, failure to implement the changes will be considered as a deficiency and will be included in the List of Deficiencies of the SAM Region; and

- Make sure that, as of 15 November 2012, all States and airspace users will accept and disseminate only information of the NEW flight plan format and of associated ATS messages, and that the capability of processing the EXISTING format is deactivated.

7.2. Preparation

In order to succeed in the implementation of the changes, CAR/SAM States need first to develop an action plan that takes into account the impact of the change on their systems, taking into consideration the aspects included in this strategy.

A project for the implementation of the new format of the flight plan will oversee the administrative aspects of the regional implementation. In order to succeed, the States, under the coordination of the ICAO Regional Offices and GREPECAS, need to develop their action plans based on the impact on their systems, taking into account the changes, directives and critical criteria defined above. Such plans must contain, as a minimum, the following topics:

- Classification of the level of evolution of their systems;

- A detailed assessment of the technical and operational impact;

- The solution to mitigate the impact, with the respective implementation timetable and those responsible for its execution;

- Deadline for the implementation of the solutions;

- Solution validation tests;

- Technical and operational training programmes; and

- Contingency measures.

Plans must be submitted to the ICAO NACC and SAM Regional Offices, which will monitor the following tasks:

TASK	START	END	RESPONSIBLE PARTY
Ensure that automated system requirements contain all the changes of the FPL form	2009	2012	Each State will indicate who is the responsible party
Ensure the proper modification of ATM automated systems for a correct analysis of the information, and the identification of the order in which messages are received, to make sure that there are no data interpretation errors.	2009	2012	Each State will indicate who is the responsible party
Carry out a comparative analysis between flight plan data processed in the NEW format and the same data treated in the EXISTING format.	2010	2011	Each State will indicate who is the responsible party

States must also agree on a joint definition of any items that are not clearly specified in the amendment before making adjustments to their systems.

7.3. Transition

The action taken in this transition phase must:

- Follow GREPECAS guidance;
- Follow the ICAO directives described in paragraph 6.2;
- Act together with the implementation coordinator;
- Carry out the activities foreseen in the action plan to mitigate technical and operational impact;
- Recognise that airspace users will only obtain benefits if the changes are implemented jointly.

In the CAR/SAM Regions, the transition period during which the ANSPs must be capable of processing both flight plan formats--EXISTING and NEW--starts on 1 July 2012 and ends on 15 November 2012.

In order to meet these time frames and harmonize implementation with other ICAO regions, delivery and testing of software and system changes shall be completed no later than 30 June 2012.

Consequently, States are urged to complete the implementation of the NEW format between 1 April and 30 June 2012, and not to use this NEW format before 1 April 2012.

Therefore, States must maintain coordination with respect to the evolution of action plans, and report any changes in dates, deadlines, etc., using the period 18 July 2011 to 1 April 2012 to deliver and test updated ANSP system software to support NEW message formats, while continuing support for PRESENT message formats.

Likewise, airspace users must take steps to adjust their systems in a precise and correct manner, in accordance to the NEW and EXISTING flight plan formats.

Implementation coordination meetings will be held periodically in order to assess the plans, so that States and ANSPs will be confident that the region can implement Amendment 1 between 1 April and 30 June 2012.

Each State shall designate a contact person to coordinate with ICAO and other States during the transition to the new flight plan format.

7.4. Post-transition

States must discontinue the processing of the EXISTING flight plan format on 15 November 2012.

They must also ensure that ATM systems, whether or not automated, process all the information contained in the NEW flight plan format correctly, and provide support for their operation.

Any difficulties observed must be assessed and resolved by the parties involved, ANSPs and/or airspace users.

8. Administrative aspects

States must assess all the documents involved, including Letters of Operational Agreement, Contingency Plans, and Operational Models.

For all purposes, this document establishes the following process:

1 Periodic meetings and discussions to identify requirements and preferred technical solution(s), alternatives, and options for the implementation of the new flight plan format;

a) In order to facilitate a common understanding of Amendment 1 and its impact to automated and manual systems among the member States and ANSPs, a two-day seminar and workshop is tentatively planned for June 2010.

b) The seminar/workshop will be followed by a two-day meeting of the project for the implementation of the flight plan new format to address revisions or updates to the Strategy for Implementation of Amendment 1, develop conclusions to be forwarded to various subgroups or committees, and determine the schedule for additional TF meetings.

2 The exchange of reports, technical documentation, plans and programming required for ensuring a successful and timely implementation.

3 Planning, technical coordination and implementation of activities by the States, under the coordination of the ICAO Lima and Mexico Offices.

9. Financial aspects

The participating States, as individual administrations, will be responsible for any financial obligation to cover direct and indirect expenditures related to the implementation of this strategy, including those related to the acquisition of the equipment, spare parts, training of technical and operational personnel, lines of communication, and others.

States may establish mechanisms for the implementation of this strategy; for instance, through ICAO technical Cooperation projects, under the supervision of the ICAO Regional Offices.

IMPLEMENTATION OF NEW FLIGHT PLAN FORMAT				
Benefits				
Efficiency **Safety**	• improved operational efficiency; • enhanced airspace capacity; • improved implementation on a cost-effective basis; • improved safety management			
Strategy Near term (2012)				
ATM Component	**TASK DESCRIPTION**	**START-END**	**RESPON-SIBLE**	**STATUS**
SDM	a) Guidelines on transition to new Flight Plan Format	2009	ICAO	Completed
	b) Develop regional strategy for transition to new Flight Plan Format	March 2010	ICAO	Completed
	c) Identification of stakeholders involved and possible impact by implementation of New Flight Plan Format (FPL/RPL/CPL)	1/10/2009-30/6/2010	States, Territories, Int. Org	Valid
	d) Evaluation of current/future flight plan processing capabilities regarding the New Flight Plan Format.	1/10/2009-30/12/2010	States, Territories, Int. Org	Valid
	e) Conduct trials between systems with NEW flight Plan processing capacity.	18/7/2011-30/6/2012	States, Territories, Int. Org	Valid
	f) Develop of contingency procedures and determination of operational/technical considerations for the transition	1/1/2011-30/6/2011	States, Territories, Int. Org	Valid
	g) Identification of major parties considering FP data flow and definition of transition steps based on: • Systems with capability to process both formats: current and NEW. • Systems to be upgraded/implemented before 2012 and that will be capable to process New Flight Plan Format.	1/1/2011-30/6/2011	States, Territories, Int. Org	Valid
	h) Publication on Transition Actions, Trials and other publication for the users and stakeholders	30/6/2011-30/6/2012	GREPECAS	Valid
	i) Assessment of Transition Actions and make adjustments	18/7/2011-30/6/2012	States, Territories, Int. Org	Valid
	j) Conduct Transition plan	1/4/2012-30/6/2012	States, Territories, Int. Org	Valid
	k) Monitor the transition activities	1/10/2009-15/12/2012	ICAO	Valid
GPIs	GPI/1: flexible use of airspace; GPI/6: air traffic flow management; and GPI/7: dynamic and flexible ATS route management; GPI/9: Situational awareness; GPI/13: aerodrome design and management; GPI/14: runway operations; and GPI/16: decision support and alerting systems; GPI/17: implementation of data link applications; GPI/18: aeronautical Information; GPI/19: meteorological systems; GPI-21: Navigation Systems; GPI-22: Communications Infrastructure and GPI-23: Aeronautical radio spectrum.			

Agenda Item 5: Review to the organization of the new CNS/ATM Subgroup work considering the performance-based approach projects methodology for the execution of the work programme

5.1 The Meeting, taking into consideration that the NAM/CAR Regional Plan for the implementation of performance-based air navigation, the CNS/ATM implementation plans in the SAM Region, the status of implementation of GREPECAS pending conclusions, current deficiencies and new and pending activities in the CNS and ATM areas, reviewed the work programmes of projects composing the CNS/ATM Subgroup structure defined in Appendix A to Agenda Item 3.

5.2 The result of the revision of the work programmes is presented in the **Appendix** to this part of the Report. To this end, the Meeting considered that the project coordinator, together with the ICAO Regional Office in charge of coordinating the associated programme, will review the tasks initially contemplated in the work programme, will define the person responsible for the execution of tasks, once information from States is received regarding the experts that will be part of the project, will define the deliverables expected for each task for a better follow-up of the progress/achievement of each task and taking into consideration that many of the tasks contemplated in the work programme are high-level activities, will detail the task in a set of specific sub-tasks.

5.3 To this end, the Meeting formulated the following draft Decision:

Decision CNS/ATM/1-9 Revision of the work programme of CNS/ATM Subgroup projects

That the project coordinator, together with the corresponding programme coordinator, carry out before 30 June 2010, the following activities:

a) Revision of the tasks of projects work programmes presented in **Appendix** to this part of the report;

b) Definition of responsible officers for the carrying out of the tasks;

c) Identification of deliverables expected for each task;

d) Break down of tasks into sub-tasks; and

e) Remittance of the information corresponding pertaining to items a), b), c) and d) above to the ICAO NACC and SAM Regional Offices.

APPENDIX A / APENDICE A

PROJECTS WORK PROGRAMMES / PROGRAMAS DE TRABAJO DE LOS PROYECTOS

PROGRAMME/PROGRAMA: PBN
PROJECT/PROYECTO: A1. OPTIMIZE THE ATS ROUTE STRUCTURE EN-ROUTE AIRSPACE / OPTIMIZACION DE LA ESTRUCTURA DE RUTAS ATS EN EL ESPACIO AEREO EN RUTA

PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: Julio Pereira

No.	Tarea / Task	Inicio Fin / Start End	Responsable / Responsible	Estado / Status	Entregable / Deliverable
1	**2**	**3**	**4**	**5**	**6**
A 1.1	Develop the regional action plan Elaborar el plan de acción regional	2007	GREPECAS	Completed/Finalizada	Regional action plan / Plan de acción regional
A 1.2	Develop an airspace concept based on CAR/SAM PBN Roadmap and in the CAR and SAM implementation plans, in order to design and implement a inter-regional trunk route network, in the upper airspace, on the basis of PBN and, in particular, RNAV/5, taking into account interregional harmonization Elaborar un concepto del espacio aéreo basado en la hoja de ruta PBN CAR/SAM y en los Planes de Implantación CAR y SAM para diseñar e implantar una red de rutas troncales inter-regionales, en el espacio aéreo superior, basado en PBN y, en particular, RNAV/5, tomando en cuenta la armonización interregional	2011	Project Coordinator / Coordinador Proyecto		Draft Inter-regional Routes Network / Borrador de Red de Rutas Inter-regional

No.	Tarea / Task	Inicio Fin / Start End	Responsable / Responsible	Estado / Status	Entregable / Deliverable
1	**2**	**3**	**4**	**5**	**6**
A 1.3	Hold a workshop among NAM, CAR and SAM States experts to review and validate the interregional routes network proposed in A 1.2 Realizar un taller de trabajo entre expertos de los Estados NAM, CAR y SAM, a fin de revisar y validar la Red de Rutas Inter-Regional propuesta en A 1.2	2011	NACC and SAM Regional Offices / Oficinas Regionales NACC y SAM		Red de Rutas Inter-Regional Propuesta de Enmienda al Plan de Navegación Aérea CAR/SAM
A 1.4	Process the CAR/SAM Air Navigation Plan amendment proposal Procesar propuesta de enmienda al Plan de Navegación Aérea CAR/SAM	2011	NACC and SAM Regional Offices / Oficinas Regionales NACC y SAM		
A 1.5	Publish Version 1 of the CAR/SAM Inter-regional ATS Routes Network Publicar la versión 1 de la Red de Rutas ATS Inter-regional CAR/SAM	TBD	States / Estados		
A 1.6	Validity of CAR/SAM Inter-regional ATS Routes Network Entrada en vigencia de la Red de Rutas ATS Inter-regional CAR/SAM	TBD	States / Estados		

PROGRAMME/PROGRAMA: PBN
PROJECT/PROYECTO: A2. PBN SUPPORTING AIR NAVIGATION SYSTEMS / SISTEMAS DE NAVEGACION AEREA EN APOYO A LA PBN

PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: TBD

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	2	3	4	5	6
A 2.1	Analyse the results of SBAS augmentation trials conducted in the CAR/SAM Regions Analizar los resultados de los ensayos de aumentación SBAS realizados en las Regiones CAR/SAM	2002-2011		Valid /Válida	
A 2.2	Update guidelines and regional strategies for the installation and implementation of GNSS augmentation systems Actualizar los textos de orientación y las estrategias regionales para la instalación e implantación de los sistemas de aumentación GNSS	2008-2011		Valid /Válida	
A 2.3	Considerations on the feasibility of regional application, technical aspects, operational benefits, associated costs, implementation, implications for airborne equipment and other relevant aspects Consideraciones sobre la factibilidad de la aplicación regional, los aspectos técnicos, los beneficios operacionales, los costos asociados, la implantación, las implicancias para los equipos de a bordo y otros aspectos pertinentes	2008-2011		Valid /Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	2	3	4	5	6
A 2.4	Conduct studies on options for regional implementation of an SBAS/GBAS system, taking into account GNSS evolution Dirigir estudios sobre las opciones de implantación de un sistema SBAS/GBAS a nivel regional, tomando en cuenta la evolución del GNSS	2002 -2011		Valid /Válida	
A 2.5	Develop proposals for regional guidelines for the evolution of air navigation systems Desarrollar propuestas sobre directrices regionales para la evolución de los Sistemas de Navegación Aérea	2008-2010		Valid /Válida	
A 2.6	Provide guidance to the States of the Region with respect to the practical methodology for the implementation of GBAS systems Orientar los Estados de la Región respecto a la metodología práctica para implementación de sistemas GBAS	2008-2011		Valid /Válida	
A 2.7	Analyse the ground navigation infrastructure supporting PBN implementation Analizar la infraestructura de navegación terrestre de soporte para la implantación de la PBN	2008-2011		Valid /Válida	

PROGRAMME/PROGRAMA: ATFM
PROJECT/PROYECTO: B1. IMPROVE DEMAND AND CAPACITY BALANCING / MEJORAR EL EQUILIBRIO ENTRE LA DEMANDA Y LA CAPACIDAD

PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: George Hof

No.	Tarea / Task	Inicio Fin / Start End	Responsable / Responsible	Estado / Status	Deliverable / Entregable
1	2	3	4	5	6
B 1.1	Develop a CAR/SAM ATFM Roadmap taking into consideration inter-regional harmonization Desarrollar una Hoja de Ruta ATFM CAR/SAM, tomando en cuenta la armonización inter-regional	2010 - 2011		Valid	CAR/SAM ATFM Roadmap/Hoja de ruta
B 1.2	Establish a Collaborative Decision Making process Establecer un proceso de toma de decisiones en colaboración	2010 - 2012		Valid	
B 1.3	Identify key stakeholders (ATC service providers and users, military authorities, airport authorities, aircraft operators and relevant international organisations) for purposes of coordination and cooperation, using a CDM process Identificar a las partes interesadas clave (proveedores y usuarios de servicio ATC, autoridades militares, autoridades aeroportuarias, operadores de aeronaves y organizaciones internacionales relevantes) para coordinación y cooperación mediante un proceso CDM;	2008	GREPECAS	Completed/Completado	Key stakeholders for purposes of coordination and cooperation, using a CDM process identified/ Partes interesadas clave para coordinación y cooperación mediante un proceso CDM identificadas
B 1.4	Develop methods to establish demand/capacity forecasting; Elaborar métodos para establecer pronósticos de demanda/capacidad	2007- 2012		Valid/Válida	
B 1.5	Develop regional procedures for efficient and optimum use of aerodrome and runway capacity Desarrollar procedimientos regionales para un uso eficiente y optimo de la capacidad de aeródromo y de pista	2008- 2012		Valid/Válida	

No.	Tarea / Task	Inicio Fin / Start End	Responsable / Responsible	Estado / Status	Deliverable / Entregable
1	**2**	**3**	**4**	**5**	**6**
B 1.6	Identify and analyse traffic flow problems and develop methods for improving efficiencies on gradual basis, as needed, through enhancements in current: • airspace organization and management (AOM) and airway structure (unidirectional routes) • communication, navigation and surveillance systems • aerodrome capacity • ATS capacity, and • ATS letters of agreement Identificar y analizar problemas de corriente de tránsito y elaborar métodos para mejorar la eficiencia de manera gradual, según se requiera, mediante mejoras en: • ***la*** organización y gestión del espacio aéreo (AOM) y estructura de las aerovías (rutas unidireccionales), • sistemas de comunicación, navegación y vigilancia, • capacidad aeroportuaria • capacidad *ATS, y* • *cartas de* acuerdo *ATS*	2008- 2012		Valid/Válida	
B 1.7	Develop a regional ATFM procedural manual to manage demand/capacity balancing Desarrollar un manual regional de procedimientos ATFM para la gestión del equilibrio entre demanda y capacidad	2008- 2011		Valid/Válida	
B 1.8	Develop a regional strategy and framework for the implementation of Centralized ATFM unit Desarrollar una estrategia y marco de referencia para la implantación de unidad centralizada ATFM	2008- 2014		Valid/Válida	

No.	Tarea / Task	Inicio Fin / Start End	Responsable / Responsible	Estado / Status	Deliverable / Entregable
1	2	3	4	5	6
B 1.9	Develop operational agreements between Centralized ATFM units for interregional demand/capacity balancing Desarrollar procedimientos operacionales entre unidades ATFM centralizadas para el equilibrio entre demanda y capacidad interregional	2008- 2014		Valid/Válida	
B 1.10	Define common elements of situational awareness between FMUs; ▪ common traffic displays, ▪ common weather displays (Internet), ▪ communications (teleconferences, web), and ▪ daily teleconference/messages methodology advisories Definir los elementos comunes de conciencia situacional; ▪ visualización común de tránsito, ▪ visualización común de condiciones meteorológicas (Internet), ▪ comunicaciones (conferencias telefónicas, web), y ▪ metodología de asesorías diarias por medio de conferencias telefónica	2008- 2012		Valid/Válida	
B 1.11	Define common electronic information and minimum databases required for decision support and alerting systems for interoperable situational awareness between Centralized ATFM units Definir la información electrónica y bases de datos mínimas comunes requeridas para apoyar las decisiones y sistemas de alerta para una conciencia situacional interoperable entre las unidades ATFM centralizadas	2008- 2014		Valid/Válida	

No.	Tarea / Task	Inicio Fin / Start End	Responsable / Responsible	Estado / Status	Deliverable / Entregable
1	**2**	**3**	**4**	**5**	**6**
B 1.12	Implement additional/advanced automation support tools to increase aeronautical information sharing ▪ ETMS or similar ▪ MET information ▪ AIS/NOTAM dissemination ▪ Surveillance tools to identify airspace sector boundaries ▪ Use of A-SMGC in specific aerodromes Implantar herramientas de apoyo adicionales/avanzados de automatización, para aumentar la compartición de información aeronáutica: ▪ ETMS o similar ▪ información MET ▪ Difusión AIS/NOTAM ▪ Herramientas de vigilancia para identificar los límites de sector del espacio aéreo ▪ Uso del A-SMGC en aeródromos específicos	2008- 2014		Valid/Válida	
B 1.13	Develop of contingency procedures and determination of operational/ technical considerations for the transition Desarrollar procedimientos de contingencia y determinar consideraciones operacionales/técnicas para la transición	2011-2012		Valid/Válida	
B 1.14	Identify training needs and develop corresponding guidelines Identificar necesidades de entrenamiento y desarrollar lineamientos correspondientes	2011-2012		Valid/Válida	
B 1.15	Formulate an ATFM system performance monitoring plan Formular un plan para la supervisión de la performance del sistema ATFM	2010-2011		Valid/Válida	

No.	Tarea / Task	Inicio Fin / Start End	Responsable / Responsible	Estado / Status	Deliverable / Entregable
1	**2**	**3**	**4**	**5**	**6**
B 1.16	Monitor implementation progress in accordance with CAR/SAM ATFM implementation roadmap and State implementation plans Supervisar el progreso de implantación de acuerdo con la hoja de ruta de implantación ATFM y los planes de implantación de los Estados	2010-2015		Valid/Válida	
B 1.17	Develop a regional strategy and work programme for harmonized implementation of ATFM service Elaborar una estrategia y programa de trabajo regionales para la implementación del servicio ATFM	2007	GREPECAS	Completed/Finalizada	

PROGRAMME/PROGRAMA: ATFM
PROJECT/PROYECTO: B2.FLEXIBLE USE OF AIRSPACE / USO FLEXIBLE DEL ESPACIO AEREO
PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: George Hof

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	2	3	4	5	6
B 2.1	Develop guidance material on civil/military coordination and co-operation to be used by States/Territories to develop national policies, procedures and rules Elaborar material de orientación sobre coordinación y cooperación civil/militar a utilizar por parte de los Estados/Territorios para elaborar políticas, procedimientos y normas nacionales	2007			
B 2.2	Establish civil/military coordination bodies Establecer cuerpos de coordinación civil/militar	2008- 2014		Valid/Válida	
B 2.3	Arrange for permanent liaison and close cooperation between civil ATS units and appropriate air defense units Hacer arreglos para tener un enlace permanente y una estrecha cooperación entre dependencias civiles ATS y las dependencias apropiadas de defensa aérea	2008- 2014		Valid/Válida	
B 2.4	Conduct a regional review of special use airspace Llevar a cabo una revisión regional del espacio aéreo de uso especial	2008- 2014		Valid/Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	**2**	**3**	**4**	**5**	**6**
B 2.5	Develop a regional strategy and work programme for implementation of flexible use of airspace in a phased approach beginning with more dynamic sharing of restricted airspace while working towards full integration of civil and military aviation activities by 2014 Elaborar una estrategia y programa de trabajo regionales para la implementación del uso flexible del espacio aéreo a través de un enfoque por fases, empezando por compartir de manera más dinámica el espacio aéreo restringido a la vez que se trabaja para la integración total de las actividades de aviación civiles y militares en 2014	2008- 2014		Valid/Válida	
B2.6	Full integration of civil and military aviation activities by 2016 Integración total de las actividades de aviación civiles y militares en 2016	2008- 2016		Valid/Válida	
B 2.7	Monitor implementation progress Monitorear el avance de la implementación	In progress/ En progreso		Valid/Válida	

No.	**Tarea/Task**	**Inicio Fin / Start End**	**Responsable / Responsible**	**Estado/Status**	**Deliverable/Entregable**
1	**2**	**3**	**4**	**5**	**6**
B 2.8	Define a regional strategy to implement the use of a flexible upper airspace (FUA): • evaluate the management processes in the use of the airspace; • improve the current domestic airspace management to adjust dynamic changes to the traffic flows in tactical stages; • introduce improvements to the ground ATS systems and associated procedures for the extension of the FUA with dynamic management processes in the use of the airspace • dynamically implement ATC sectorization with the aim of providing a better balance between demand and capacity that responds in real time to changing situations in the traffic flows and to accommodate in the short-term the users preferred trajectories Desarrollar una estrategia regional para la implantación del uso flexible del espacio aéreo (FUA) o evaluar los procesos de gestión en el uso del espacio aéreo; o mejorar la actual gestión del espacio aéreo nacional para ajustar cambios dinámicos a los flujos de tráfico en la etapa táctica; o introducir mejoras a los sistemas ATS de tierra y procedimientos asociados para la extensión del FUA con procesos dinámicos de gestión en el uso del espacio aéreo; o implantar dinámicamente la sectorización ATC a fin de proporcionar el mejor equilibrio entre demanda y capacidad que responda en tiempo real a las situaciones cambiantes en los flujos de tráfico y para acomodar a corto plazo las trayectorias preferidas de los usuarios	2008- 2015		Valid/Válida	
B 2.9	Identify training needs and develop corresponding guidelines Identificar las necesidades y desarrollar las directrices correspondientes.	2011-2012		Valid/Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	**2**	**3**	**4**	**5**	**6**
B 2.10	Train ATCOs and pilots in new procedures, including all civil and military airspace users, as required Entrenar a los ATCOs y pilotos en Nuevos procedimientos, incluyendo todos los usuarios del espacio aéreo, cuando sea requerido.	2008-2012		Valid/Válida	
B 2.11	Develop situational awareness training programmes for pilots and controllers Desarrollar programas de entrenamiento sobre conciencia situacional para pilotos y controladores.	2008-2012		Valid/Válida	

PROGRAMME/PROGRAMA: AUTOMATION AND ATM SITUATIONAL AWARENESS / AUTOMATIZACION Y COMPRENSION SITUACIONAL ATM

PROJECT/PROYECTO: C1. AUTOMATION / AUTOMATIZACION

PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: André Eduardo Jansen

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/ Entregable
1	**2**	**3**	**4**	**5**	**6**
C 1.1	Identify the automation level required according to the ATM service provided in airspace and international aerodromes, assessing o operational architecture design, o characteristics and attributes for interoperability, o data bases and software, and o technical requirements. Identificar el nivel de automatización requerido de acuerdo con el servicio ATM proporcionado en el espacio aéreo y los aeródromos internacionales, valorando: o el diseño de la arquitectura operacional, o características y atributos para la interfuncionalidad, o bases de datos y software, o FPL, CPL, CNL, RLA, etc., y o Requerimientos técnicos.	2008-2010		Valid/Válida	
C1.2	Orientaciones para la elaboración de Memorándum de Entendimiento para la implantación de la interconexión de sistemas automatizados Guidelines for elaboration of Memorandum of Understanding for the implementation of the automation system interconnection	2010 / 2012		Valid/Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/ Entregable
1	**2**	**3**	**4**	**5**	**6**
C 1.3	Monitor the implementation of flight plan data processing system and electronic transmission tools Monitorear la implantación de sistema de proceso de datos de plan de vuelo y herramientas para la transmisión electrónica	2008-2012		Valid/Válida	
C1.4	Monitor implementation ATS of automated flight plan messages exchanges as required Monitorear la implantación del intercambio automático de mensajes ATS de planes de vuelo, según se requiera	2008- 2012		Valid/Válida	
C1.5	Monitor ATM automation implementation and surveillance data exchange Monitorear la implantación de automatización ATM y el intercambio de datos de vigilancia	2008- 2014		Valid/Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/ Entregable
1	**2**	**3**	**4**	**5**	**6**
C1.6	Monitor Implementation of additional/advanced automation support tools to increase aeronautical information sharing • ETMS or similar • MET information • AIS/NOTAM dissemination • Surveillance tools to identify airspace sector boundaries • Use of A-SMGC in specific aerodromes, as required Monitorear la implantación de herramientas de apoyo adicionales/avanzadas de automatización para incrementar la compartición de la información aeronáutica • ETMS o similar • Información MET • Divulgación AIS/NOTAM • Herramientas de vigilancia para identificar los límites del sector en el espacio aéreo • Uso de A-SMGC en aeródromos específicos, según sea requerido	2008-2014		Valid/Válida	
C1.7	Monitor implementation progress Monitorear el desarrollo de la implementación	2008/2014		Valid/Válida	

PROGRAMME/PROGRAMA: AUTOMATION AND ATM SITUATIONAL AWARENESS / AUTOMATIZACION Y COMPRENSION SITUACIONAL ATM

PROJECT/PROYECTO: C2. IMPROVE ATM SITUATIONAL AWARENESS / MEJORA A LA COMPRENSION SITUACIONAL ATM

PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: Veronica Ramdath

No.	**Tarea/Task**	**Inicio Fin / Start End**	**Responsable / Responsible**	**Estado/Status**	**Deliverable/Entregable**
1	**2**	**3**	**4**	**5**	**6**
C 2.1	Identify parties concerned Identificación de las partes interesadas	2009	GREPECAS	Completed/Finalizada	Identification of parties concerned Identificación de las partes interesadas
C 2.2	Evaluation of surveillance infrastructure and Identification of Surveillance system improvements to support continental en-route and terminal Airspace in CAR/SAM Regions, airspace classification, PBN and the ATFM Evaluación de la infraestructura de vigilancia e identificación de mejoras a los sistemas de vigilancia para apoyar los espacios aéreos enruta y terminal en las regiones CAR/SAM, la clasificación del espacio aéreo, la PBN y el ATFM	2009-2012		Valid/Válida	
C 2.3	Develop situational awareness training programmes guidelines for pilots and controllers and technical/maintenance personnel. Desarrollar programa de instrucción sobre comprensión de la situación para pilotos y controladores	2008-2012	States/ Territories/ Int. organizations	Valid/Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	**2**	**3**	**4**	**5**	**6**
C 2.4	Monitor the implementation of ATM surveillance systems for situational traffic information and associated procedures Monitorear la implantación de sistemas de vigilancia ATM para la información de la situación del tránsito y procedimientos asociados	2010-2015		Valid/Válida	
C 2.5	Monitor the implementation of ground and air electronic warnings, as needed • Conflict prediction • Terrain proximity • MSAW • DAIW • Surveillance system for surface movement Monitorear la implantación de avisos terrestres y aéreos electrónicos, según sea necesario • predicción de conflictos • proximidad en el terreno • MSAW • DAIW • Sistema de vigilancia para el movimiento en la superficie	2008/2014		Valid/Válida	
C 2.6	Elaboración de un plan regional para la implantación del ADS- C y ADS B Elaboration of a Regional Plan for the implementation of ADS –C and ADS B	2008/2014		Valid/Válida	
C 2.8	Monitor the regional activities to optimize the use of radio frequency environment Monitorear las actividades para optimizar el uso del entorno de radio frecuencia	2009/2011		Valid /Valido	

PROGRAMME/PROGRAMA: AUTOMATION AND ATM SITUATIONAL AWARENESS / AUTOMATIZACION Y COMPRENSION SITUACIONAL ATM

PROJECT/PROYECTO: C3. IMPLEMENTATION OF THE NEW ICAO FLIGHT PLAN MODEL / IMPLANTACION DEL NUEVO MODELO DE PLAN DE VUELO DE LA OACI

PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: Jorge Avila

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	**2**	**3**	**4**	**5**	**6**
C 3.1	Guidelines on transition to new Flight Plan Format Guías sobre la transición al Nuevo Formato de Plan de Vuelo Presentado.	2009	ICAO/OACI	Finalized/Completada	Guidelines on transition to new Flight Plan Format / Guías sobre la transición al Nuevo Formato de Plan de Vuelo Presentado
C 3.2	Develop regional strategy for transition to new Flight Plan Format Elaborar una estrategia regional de transición al nuevo formato de plan de vuelo presentado	2009/ 2010	ICAO/OACI	Finalized/Completada	Strategy was reviewed and approved during the CNS/ATM/SG/1 meeting/ Estrategia fue revisada y aprobada durante la reunión CNS/ATM/SG/1
C 3.3	Identification of stakeholders involved and possible impact by implementation of New Flight Plan Format (FPL/RPL/CPL) Identificación de interesados involucrados y posible impacto de la implantación del nuevo formato de plan de vuelo presentado (FPL/RPL/CPL)	1/10/2009-30/6/2010		Valid /Válida	
C 3.4	Evaluation of current/future flight plan processing capabilities regarding the New Flight Plan Format Evaluación de las capacidades actuales/futuras de procesamiento de plan de vuelo con respecto al Nuevo formato de plan de vuelo presentado	1/10/2009-30/12/2010		Valid /Válida	
C 3.5	Conduct trials between systems with new flight plan processing capacity Conducir ensayos entre sistemas con capacidad de procesamiento del nuevo plan de vuelo	18/7/2011-30/6/2012		Valid /Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	**2**	**3**	**4**	**5**	**6**
C 3.6	Development of contingency procedures and determination of operational/ technical considerations for the transition Elaboración de procedimientos de contingencia y determinación de consideraciones técnicas/operacionales para la transición	1/1/2011-30/6/2011		Valid /Válida	
C 3.7	Identification of major parties considering FP data flow and definition of transition steps based on: a) Systems with capability to process both formats: current and new. b) Systems to be upgraded/implemented before 2012 and that will be capable to process New Flight Plan Format Identificación de las partes principales que consideren la afluencia de datos de FP y definición de los pasos de transición basados en: a) sistemas con capacidad de procesar ambos formatos: actual y nuevo. b) sistemas a modernizarse/implementarse antes del 2012 y que serán capaces de procesar el nuevo formato de plan de vuelo presentado	1/1/2011-30/6/2011		Valid /Válida	
C 3.8	Publication on transition actions, trials and other publication for the users and stakeholders Publicación de acciones de transición, ensayos y otras publicaciones para los usuarios e interesados	30/6/2011-30/6/2012		Valid /Válida	
C 3.9	Assessment of transition actions and make adjustments Evaluación de las acciones de transición y hacer ajustes	18/7/2011-30/6/2012		Valid /Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	**2**	**3**	**4**	**5**	**6**
C 3.10	Conduct transition plan Realizar el plan de transición	1/4/2012-30/6/2012		Valid /Válida	
C 3.11	Monitor the transition activities Monitorear las actividades de transición	1/10/2009-15/12/2012		Valid /Válida	

PROGRAMME/PROGRAMA: GROUND-GROUND AND AIR-GROUND TELECOMMUNICATIONS INFRASTRUCTURE/ INFRAESTUCTURA DE COMUNICACIONES TIERRA-TIERRA Y TIERRA-AIRE

PROJECT/PROYECTO: D1. CAR/SAM ATN ARCHITECTURE / ARQUITECTURA DE LA ATN CAR/SAM

PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: Athayde Frauche

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	**2**	**3**	**4**	**5**	**6**
D 1.1	Guide the interconnection/integration of Communications digital networks Guiar la interconexión/ integración de redes digitales de comunicaciones	2005/ 2012		Valid/Válida	
D 1.2	Technical revision of Regional Telecommunication Network for ATN implementation Revisión técnica de redes regionales de telecomunicaciones para la implantación de la ATN	2009/2011		Valid/Válida	
D 1.3	Trial implementation to determine ATN bandwidth to support ground application Implantación de pruebas para determinar el ancho de banda de la ATN para soportar las aplicaciones terrestre	2009/2011		Valid/Válida	
D 1.4	Study for an IP ATN CAR/SAM backbone network configuration Estudio para la configuración de una red medular IP para las Regiones CAR/SAM	2009/2011		Valid/Válida	
D 1.5	Update of CAR/SAM Router Plan Actualización del plan regional CAR/SAM de encaminadores	2011		Valid/Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Deliverable/Entregable
1	**2**	**3**	**4**	**5**	**6**
D 1.6	Analyse proposals for data Communications infrastructure in support of ATFM implementation This activity supports the activity *Support PBN and ATFM implementation, optimization of ATM routes and guidance for ATM service automation* covered in the surveillance area. Analizar las propuestas de infraestructura de comunicaciones de datos en apoyo de la implantación de la ATFM Esta actividad apoya la actividad *Soporte a la implantación del PBN el ATFM, optimización de las rutas ATM y guías para el servicio de automatización ATM* cubierta en el área de vigilancia.	2009/2011		Valid/Válida	
D 1.7	Elaborate a CAR/SAM plan for the establishment of the communications system needed for the migration towards aeronautical MET messages exchange (METAR/SPECI and TAF) in the new format to be defined Elaborar un plan CAR/SAM para establecer el sistema de comunicaciones necesario para la migración hacia el intercambio de mensajes aeronáuticos MET (METAR/SPECI y TAF) en el nuevo formato a definirse	TBD		Valid/Válida	

PROGRAMME/PROGRAMA: GROUND-GROUND AND AIR-GROUND TELECOMMUNICATIONS INFRASTRUCTURE/ INFRAESTUCTURA DE COMUNICACIONES TIERRA-TIERRA Y TIERRA-AIRE

PROJECT/PROYECTO: D2. ATN GROUND-GROUND AND AIR-GROUND APPLICATIONS / APLICACIONES TIERRA-TIERRA Y AIRE-TIERRA DEL ATN

PROJECT COORDINATOR/ COORDINADOR DEL PROYECTO: Dulce Roses

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Entregable/ Deliverable
1	**2**	**3**	**4**	**5**	**6**
D 2.1	Review, update and complete initial transition plan for the evolutionary development of ATN and applications Revisar, actualizar y completar el plan de transición inicial para el desarrollo evolutivo de la ATN y sus aplicaciones	2003/2010		Valid/Válida	
D 2.2	Guide de development of ATN addressing plan according to ICAO technical principles and guidelines Orientar el desarrollo del plan de direccionamiento ATN, de conformidad con los principios y disposiciones técnicas de la OACI	2008/2010		Valid/Válida	
D 2.3	Implementation Plan for ATN Ground-ground applications (AMHS) Plan de implantación de las Aplicaciones tierra-tierra del ATN (AMHS)	2010		Valid/Válida	
D 2.4	Implementation Plan for ATN Ground-ground applications (AIDC) Plan de implantación de las Aplicaciones tierra-tierra del ATN (AIDC)	2010		Valid/Válida	

No.	Tarea/Task	Inicio Fin / Start End	Responsable / Responsible	Estado/Status	Entregable/ Deliverable
1	**2**	**3**	**4**	**5**	**6**
D 2.5	Coordination and trials for ATN ground applications implementation Coordinación y prueba para aspecto de implantación de aplicaciones tierra tierra de la ATN	2008/ 2011		Valid/Válida	
D 2.6	Develop a VDL implementation Plan and its application Desarrollar un plan de implantación VDL y su aplicación	2011		Valid/Válida	
D 2.7	Monitor VDL implementation trials and its applications Monitorear implementación de ensayos de VDL y sus aplicaciones	2008/2011		Valid/Válida	
D 2.8	Initial transition plan of ground/air ATN application Plan de transición inicial de las aplicaciones tierra aire de la ATN	2008/2012		Valid/Válida	
D 2.9	Monitor implementation of technology available to facilitate ground and onboard applications Monitorear la implantación de tecnologías disponibles para facilitar aplicaciones en tierra y a bordo	2008/2012		Valid/Válida	

Agenda Item 6: Other matters

Search and Rescue Services

SAR Performance framework

6.1 The Meeting acknowledged that the Search and Rescue (SAR) Meeting for the North American, Caribbean, and South American Regions (SAR/NAM/CAR/SAM) held in Puntarenas, Costa Rica, on 18-22 May 2009, recognised that some States were still making efforts for the full adoption of Recommendation RAN CAR/SAM/2-3 and GREPECAS/11 conclusions concerning SAR.

6.2 Considering the above, national strategies for improving the SAR service are required. The mentioned meeting agreed on Conclusion 4 – preparation of work programmes aimed at performance, through which NAM/CAR/SAM Regions States, Territories and International Organizations involved in the provision of SAR system, are encouraged to develop their respective plans and work programmes, based on the performance objective to improve the SAR system.

6.3 Therefore, the Meeting agreed that States should assess their SAR capabilities. This information will serve as a basis for improving the regional SAR system. To this end, the States/Territories/International Organisations should:

a) develop a CAR/SAM SAR Quality Assurance Manual (see WP/22);
b) review the existing SAR agreements, and update and obtain from other States the authorisation for SAR units to provide SAR support within the jurisdiction of those other States;
c) establish an appropriate coordination between civil and military authorities with a view to an efficient use of all SAR resources available; and
d) assess and publish their SAR response capabilities within their area of jurisdiction.

6.4 To this end, States/Territories/International Organizations are encouraged to adopt the SAR sample form with the performance objective approved by the NAM/CAR/SAM SAR meeting for improving the SAR system, so that they may develop their own national SAR strategy, shown in **Appendix A** to this part of the report.

Quality Assurance Manual on Search and Rescue Services

6.5 The meeting was informed that, recognising the evident advantages of implementing quality programmes in ATS services, the First Meeting of the ATM Committee of the GREPECAS ATM/CNS Subgroup, Redondo Beach, United States, July 2001, approved for its work programme, Task N° ATM-SAR/502. This task consisted of developing a Quality Assurance programme for Search and Rescue services in accordance with IAMSAR Manual, for its future implementation in the CAR/SAM Regions.

6.6 In view that the ATM Committee did not have sufficient contribution of SAR experts, the SAM SAR Informal Meeting (SAM 90/03 – SAR), Lima, Peru, September 2003, and after discussing different points of view on this respect, agreed to create a Task Force for the preparation of guidance material quality assurance programmes for SAR units (QA SAR/TF), in order to present it to the ATM Committee for its evaluation.

6.7 The following search and rescue meetings for the SAM Region progressively reviewed the drafts of the CAR/SAM regional guidance material on search and rescue services quality assurance programmes, agreeing that the resulting text be reviewed by SAM States, and then that the latter submit to the Secretariat their observations and/or comments to this respect.

6.8 During the Search and Rescue (SAR) Meeting for the North American-Caribbean and South American Regions (Puntarenas, Costa Rica, 18 to 22 May 2009) the Quality Assurance Manual for Search and Rescue Services was presented for its analysis and pertinent actions. Such meeting agreed that each participating delegation will review the draft SAR quality assurance manual, agreeing to submit the remarks and/or comments, if any, to the Secretariat.

6.9 To this end, the Meeting was informed that if no comments are received, it will be considered that the Search and Rescue Quality Assurance Manual shown in **Appendix B** to this part of the report, is ready to be submitted to GRPECAS by the CNS/ATM/SG and will be adopted for its approval in the CAR/SAM Regions.

ICAO Training Guides for Developing the Competencies of Aeronautical Professionals

6.10 In order to deal with this matter the meeting took as reference that ICAO and the aeronautical industry have focused on attaining and implementing a performance-based air navigation system, derived from industry good practices that have evolved throughout the years outside of the aviation field. Since the aviation industry has evolved to become a less regulated and more corporate environment that entails greater responsibilities, the advantages of implementing a performance-based air navigation system have become more and more apparent. But the sharing of knowledge, the provision of training and specialized knowledge will also be required.

6.11 The effort involved in this task is a challenge that requires substantial coordination at all levels. Consequently, the States, through their Civil Aviation Training Centres (CATCs), should also adopt a common approach to the development and implementation of a performance-based ATM system.

6.12 In this regard, the Meeting agreed that Appendix H of Resolution A36/13: Consolidated statement of continuing ICAO policies and associated practices related specifically to air navigation, makes clear reference to aeronautical training and stipulates that contracting States will be encouraged and provided with assistance to maintain a high level of training for their aeronautical personnel, especially those engaged in the provision and operation of facilities and services geared to international civil aviation. To this end, and as part of its regular work programme, the Organization will carry out a permanent training programme that has been entitled the ICAO Aeronautical Training Programme. It also establishes some principles that will serve as a basis for the ICAO aeronautical training programme (See **Appendix C** to this part of the report).

6.13 The Eleventh Symposium and Global TRAINAIR Conference (GTC/11) which was held in Punta Cana, Dominican Republic, on 7-11 December 2009, discussed experiences and relevant aspects of performance-based aeronautical training aimed at a new generation of aeronautical professionals.

6.14 Also, the meeting was informed that in 2008 and 2009, two meetings of Directors of Civil Aviation Training Centres (CATCs) were also held in the region. The main objective of these meetings is to provide a forum for analysing personnel demand and the need for generating training capacity, analysing and assessing various alternatives to achieve availability of harmonised courses that contemplate current and future requirements within the framework of air navigation services. The next SAM CATC meeting is foreseen for November 2010.

6.15 Finally, the Meeting was informed that ICAO held a symposium on Next Generation Aeronautical Professionals for 1-4 March 2010. The topic of the symposium was "*Seeing beyond the economic crisis: Mobilisation of the aeronautical community for contracting, educating, training, and preserving the next generation of aviation professionals*". The documentation related to this event is in the ICAO Headquarters' website: (http://www.icao.int/ICAO/en/conf/index.html).

6.16 Keeping in mind the above, and while other guidelines issued by the Symposium or other forums are not available, the Meeting felt that CAR/SAM States/Territories and International Organizations, through their CATCs should continue with their efforts in order to improve training for aeronautical professionals, and to develop mid-term plans for the infrastructure and programmes that will enable them face the new challenges. This will allow administrations to have a robust aeronautical system, based not only on a well implemented system, with the necessary laws and regulations, the appropriate guidelines, and a duly organised aeronautical authority, but also with excellent training, experience, competence and dedication of its managerial, administrative and technical personnel.

6.17 To this end, the CATCs could use as a source, inter alia, the list of training requirements shown in **Appendix D** to this part of the report.

6.18 After the analysis carried out, the Meeting deemed pertinent to agree on the following draft conclusion:

Draft
Conclusion CNS/ATM/1-10 Training for aeronautical professional competence

> That CAR/SAM States/Territories and International Organizations, take into consideration the list of short and mid-term and training requirements shown in **Appendix D** to this part of the Report, so that CATCs, in coordination with civil that CAR/SAM States/Territories and International Organizations, aviation authorities, prepare aeronautical training programmes which contemplate regional air navigation and safety requirements.

6.19 In accordance with the growth of air operations, IFATCA presented information on the need of promoting a better ATS training planning and human resources management. The Meeting took note of the relationship between a safe environment culture and team work, and the management of human resources at the ATC units.

GNSS training

6.20 The Meeting took note of the development of the technical training programmes on GNSS systems for the CAR/SAM States, drafted by the GNSS/TF4 meeting. The same is oriented towards technical training in the GBAS and SBAS systems.

6.21 Also, the Meeting was informed that GNSS/TF/4 meeting had elaborated a draft Guideline for the Preparation of a GNSS Training Programme based on GBAS and SBAS, shown in **Appendix E** to this Agenda Item.

6.22 In this regard, the Meeting formulated the following draft Conclusion:

Draft
Conclusion CNS/ATM/1-11 GNSS Training

That, taking into account that training of a larger number of experts is essential for the future implementation of GNSS systems in the CAR/SAM Regions, as well as the various ICAO recommendations for the provision of GNSS technical training, and the ICAO initiative on the next generation of aviation professionals:

a) States/Territories and International Organisations are urged to foster the training of national instructors, based, *inter alia*, on courses promoted by ICAO, as a way of supporting the internal dissemination of acquired knowledge;

b) The States/Territories and International Organisations that have not yet included GNSS in their training programmes, include this type of training in their plans as of 2010; and

c) ICAO is urged to include the necessary considerations on the technical training of professionals, *e.g. training on GNSS systems*, in the initiative on next generation aviation professionals and its corresponding instances.

Development of a file server in support of the international satellite communications system for the obtaining of OPMET and WAFS products

6.23 The Meeting received information on the operation of the WAFS Internet file server (WIS), to replace the file transfer protocol (FTP) currently being used to access the OPMET products and the world area forecast system through the public Internet, in the event of unavailability of the satellite dissemination (ISCS).

APPENDIX A

SAR PERFORMANCE OBJECTIVE

IMPROVE SAR SYSTEM				
Benefits				
Efficiency **Safety**	• enhanced traffic surveillance; • enhanced collaboration between stakeholders; • improved operational efficiency; • improved implementation on a cost-effective basis; • improved safety management.			
Strategy ***Near term (2010)***				
TASK	**DESCRIPTION**	**START-END**	**RESPON-SIBLE**	**STATUS**
SDM	Develop regional strategy to improve SAR System			
	Identify parties concerned			
	Conduct comprehensive analysis of SAR requirements based on risk assessment and quality assurance principles			
	Foster the harmonization of policies, regulations, practices and procedures of the aeronautical/maritime SAR services, in accordance with ICAO Standards and Recommended Methods.			
	Develop, update and ratify SAR agreements with RCCs of adjacent States.			
	Develop, update and ratify SAR agreements with SAR service International agencies.			
	Foster the establishment of joint aeronautical/maritime SAR Committees, including the integration of voluntary SAR organizations, as well as the development of agreements between all the stakeholders of the national SAR service			
	Develop a human resources and training planning strategy in line with ICAO SAR guidelines and the regional agreements reached.			
	Monitor implementation progress			
References	GPI/6: air traffic flow management; and GPI/9: Situational awareness;			

APPENDIX B

CAR/SAM REGIONAL GUIDANCE MATERIAL ON SEARCH AND RESCUE SERVICES QUALITY ASSURANCE PROGRAMMES

Version 2.0

May 2009

INTERNATIONAL CIVIL AVIATION ORGANIZATION

CAR/SAM REGIONAL GUIDANCE MATERIAL ON SEARCH AND RESCUE SERVICES QUALITY ASSURANCE PROGRAMMES

Version 2.0

May 2009

AMENDMENTS

The issue of amendments is announced regularly by ICAO through regular correspondence with States, and the ICAO NACC and SAM Offices' websites, which holders of this publication should consult. The space below is provided to keep a record of such amendments

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date Entered	Entered by

CORRIGENDA			
No.	Date applicable	Date Entered	Entered by

Contents

Chapter 1. DEFINITIONS

Accident. Any event related to the use of an aircraft which takes place in the period running from the moment a person comes on board for purposes of some flight, to the moment when all people have disembarked, during which:

a) any individual is mortally or seriously injured as a consequence of:
- being on board the aircraft, or
- in direct contact with any part of the aircraft, including parts which may have detached from the aircraft, or
- being directly exposed to the jet of a reactor,

except when the injuries are due to natural causes, have been self inflicted or caused by other individuals, or are injuries suffered by stowaways hiding in areas other than those destined for normal use by passengers and crew, or

b) the aircraft suffers structural damage or breakage which:
- adversely affect its structural strength, its performance or flight characteristics, and
- normally require major repair or replacement of the affected component,

except for engine failure or damage, when damages are limited to the engine, its cowling or its accessories; or for limited damage to the propellers, wing tips, antennas, tires, brakes or fairings, small dents or holes in the skin of the aircraft; or

c) the aircraft disappears or is totally inaccessible.

Note 1. – *Solely for statistical uniformity purposes, any injury causing death within the 30 days following the date in which the accident occurred is classified by ICAO as mortal injury.*
Note 2. – *An aircraft is taken as disappeared when the official search is terminated and no wreckage has been found.*
{Copied from ICAO Annex 13}

Human action. Human skills and limitations which affect the safety and efficiency of aeronautical operations.
{Copied from ICAO Annex 11}

***Unnecessary SAR Alert (UNSAR*).** Message which an RCC sends to the appropriate authorities subsequent to an unnecessary activation of the SAR system due to a false alarm.

Desktop audit. Follow-up evaluation performed off-site. It may be carried out through phone interviews of SAR unit personnel and/or through the revision of recordings/data and documentation.

Search. Operation usually coordinated by an RCC o an RSC, in which available staff and means are used to locate individuals in distress.

Update training. Repeated training implemented to maintain and update previously acquired knowledge and skills.

SAR proficiency training. Training carried out to maintain and update the knowledge and skills needed for a safe and efficient application of search and rescue procedures. Proficiency training includes update, supplementary, skill enhancement and corrective training.

Simulation training. Training conducted in a classroom/lab setting training which is aimed at helping the controller apply basic skills and knowledge.

Competence-building training. Training designed to enhance a controller's competence in a skill or in some operational position which the controller is qualified to hold.

Supplementary training. Training implemented whenever there are changes in procedures, regulations or new or revised equipment.

Area Control Centre (ACC). A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Flight Information Centre (FIC). A unit established to provide flight information service and alerting service.

Rescue co-ordination centre (RCC). A unit responsible for promoting efficient organisation of SAR service within a search and rescue region.

Joint rescue co-ordination centre (JRCC). A rescue co-ordination centre responsible for both aeronautical and maritime search and rescue operations.

Mission Control Centre (MCC). A part of the Cospas-Sarsat system which accepts alerting messages from local user terminals and other mission control centres and distributes them among the appropriate rescue co-ordination centres or other search and rescue points of contact.

General communications. Operational and public correspondence communications and message traffic unrelated to assistance, emergency, or safety, sent or received *via* radioelectric waves.

Search and rescue co-ordination communications. Communications required to co-ordinate the means that participate in a search and rescue operation.

Aircraft co-ordinator. A person who co-ordinates the participation of several aircraft in SAR operations.

Search and rescue mission co-ordinator. an official on temporary assignment to co-ordinate the response to an actual or apparent danger.

Search and rescue co-ordinator (CS). A person(s) or body(ies) belonging to an Administration charged with the general responsibility of setting up and providing SAR services and of making sure that the planning of such services is duly co-ordinated.

Accident site coordinator. A person appointed to co-ordinate search and rescue operations in a given area.

Delivery of a distress alert. A report of a dangerous situation sent to a unit which could provide or co-ordinate assistance.

Coastal earth station (CES). Maritime denomination of an INMARSAT ground station which links ship earth stations to ground communication networks.

Full evaluation of the SAR unit. Full evaluation of the SAR unit conducted on-site using the national checklist to assess the performance of the SAR unit in all areas.

SAR follow-up evaluation. Follow-up evaluation conducted on-site or through a desktop audit to make sure that the specific issues detected during the full evaluation of the SAR unit have been corrected.

Special evaluations. Evaluations to assess specific areas or problems as directed by the SAR authority. These evaluations may be scheduled or unscheduled.

SAR operational functions. Functions concerning the provision of a SAR service or the monitoring of such functions.

Means for search and rescue. Any mobile resource, including the units designated for search and rescue, which is used in search and rescue operations.

Search and rescue plan. General term used to describe the documents existing at all levels of national and international search and rescue structures, which detail the objectives, measures and procedures that support the provision of search and rescue services.

Three-step closure process. The three-step closure process is the method whereby the unsatisfactory points of an evaluation must be corrected and closed. The required response must be available after 60 and 180 calendar days and must describe the following three steps:

a) **Corrective action**. The initial action taken by the SAR unit to correct the discrepancy;

b) **Follow-up action**. Action taken during some period of time to confirm that the initial action did correct the discrepancy. It includes the date(s) when it was taken and the results obtained; and

c) **Managerial control**. Action taken by the SAR authority or unit for purposes of making sure that the problem will not happen again. Such action must identify those positions within the SAR unit that are responsible for periodically checking on the corrected discrepancy and deciding when such review will take place.

Search and rescue data supplier. A source with which an RCC gets in touch to obtain data to support search and rescue operations, including emergency information originating from communication equipment data bases, ship reporting systems and environmental data systems (e.g. meteorological data, marine currents or ELT 406 MHz data bases).

Alerting post. Any means designated to serve as an intermediate post between an individual reporting an incident and a rescue co-ordination centre or sub-centre.

SAR point of contact (SPOC). Rescue co-ordination centres or other established and recognised national contact points which can accept the responsibility for receiving Cospas-Sarsat alerting data for purposes of saving people in distress.

Person locator beacon (PLB). Personal assistance beacon which broadcasts alerts and issues signals for the homing radio.

Emergency position-indicating radio beacon (EPIRB). Device usually carried on board a ship which serves to broadcast a signal to alert search and rescue authorities and to allow rescue units to locate the site of the accident.

Distance-finding (DF). Radio homing on signals to determine a position.

Search and rescue region (SRR). An area of defined dimensions associated to an RCC within which search and rescue service is provided.

Chapter 2. BACKGROUND

2.1 The mission of SAR services is to find, assist and transport people in distress to a safe place where they will be properly taken care of. The key to organising and having successful SAR services lies in top management, whose mission is to perform managerial functions that will result in improved SAR operations, that is, having an organised, trained and available SAR system for the provision of effective assistance to people in distress.

2.2 The most common reasons why SAR top management fails in its mission are: deficient management of the SAR system under its responsibiltity, incorrect application of correct measures, attempting to do everything on its own using personal or sectoral criteria which are not always applicable, or lack of prior knowledge of the actual status of the SAR system being managed.

2.3 Initiatives aimed at enhancing the quality of SAR services will bring about substantially improved results and reduced costs, mainly by the elimination of the causes of unnecessary expenditures. These are important objectives of any administration, regardless of the amount of resources available. When top management assigns importance to quality, it tends to:

- carry out more activities, and make less mistakes;
- develop a good reputation; and
- raise the necessary resources for the growth and better performance of the system.

2.4 On the other hand, SAR organisations that neglect quality are subject to errors which may result in:

- a reduced number of lives saved;
- the adoption of wrong or late operational decisions that contribute to:

  1) confusion, accidents and equipment failures;
  2) incorrect or insufficient use of resources; and
  3) unnecessary spending of financial resources.

2.5 Due to increased air traffic activity and the use of large aircraft capable of carrying a large number of passengers, and its relationship with the responsibility of CAR/SAM States/Territories/International Organisations of safeguarding the safety of human lives, it was deemed important to develop a Search and Rescue (SAR) Services Quality Assurance programme with guidelines for the States on the implementation of such programme, so that it could be a useful quality management tool to ensure compliance with the objective of the National SAR Plan of each CAR/SAM State of saving lives by improving SAR preparedness.

2.6 The programme would also provide efficient SAR services within their respective SAR areas of responsibility, so that the needs arising in the event of accident of a large aircraft may be foreseen and met.

2.7 Prompt notification to a SAR unit of a danger threatening crews and passengers, as well as the planning of the operations required to assist them, are essential to ensure high safety standards in air and maritime activities, since they expedite the adoption of actions for their prompt resolution. It is also important for the results to be available to States, international organisations and ICAO, so as to have a better dissemination of lessons learned.

2.8 Quality assurance is a dynamic process used for continuous improvement of a SAR system. Although service quality will continue to be measured by some historical data method, such as the number of search and/or rescue missions conducted by air or maritime SAR units, delays in operations or communications established, or feedback from employees and customers, consideration should also be given to other factors that may not be so readily measured, such as the desire to work as a team, training, and action taken to support the SAR goal.

2.9 All these factors are also an important part of quality assurance. The success of the quality assurance effort depends on the recognition that all SAR providers in the CAR/SAM Regions, individually and collectively, must strive to provide the best possible service.

2.10 Thus, for its successful application, quality assurance in SAR services must include important functions such as: the selection, development and training of employees, communication, and the implementation of a participatory management.

2.11 Personnel **selection** is important because the new members of the SAR organisation must have skills consistent with the quality assurance philosophy (team work, responsibility, participation and commitment). It is desirable that individuals entering the organisation be highly capable of solving problems and that they have special skills (capable of working as a team, accountability, spirit of participation).

2.12 The area of **training** will also be essential in order to have personnel duly trained so that it can participate and introduce quality improvements. When hiring new personnel, an effort is made so that they may attain the foreseen objectives; the time and training devoted to the team and its development are an investment rather than a financial loss. There is a need to train both employees and managers, not only on quality improvement methods, but also on institutional processes and procedures, and to instill on them a quality culture.

2.13 Lack of training is an obstacle for participation programmes, which are a basic element of quality assurance. If the context is to support a participatory attitude, employees need to receive proper training. It should also be considered that, without the basic knowledge, the staff will not be able to carry out their job. The knowledge that employees require is basically that related to inter-personal and group relations and job skills.

2.14 On the other hand, the primary method that is used to motivate employees to adopt and participate in a quality assurance programme is a training programme where all the members of the organisation, at all levels, receive initial training on basic quality assurance concepts, in order to facilitate their understanding and encourage them to receive training and improve their communication skills, team work and participation at meetings.

2.15 Quality training and participation are closely linked. The improvement of SAR services is the responsibility of all its members. Therefore, training should be provided so that suggestions may come from every operational or managerial position. The idea is that they acquire a vision that is broad enough to allow them to improve the process as a whole and not just the one that corresponds to each individual post.

2.16 **Communication** should include the necessary methods to provide useful information for performing a good job and for better adaptation to the organisational culture. Personnel participation requires both training and information.

2.17 The communication of positive results obtained in the provision of services improve the morale and motivation of the personnel, while negative results should elicit efforts to overcome them. When relating participation to quality assurance, the importance of having good communication channels throughout the SAR organisation is highlighted.

2.18 In order to improve quality, the staff needs information on their performance, results obtained, and the contribution they make. Based on this information, people improve their knowledge and propose improvements which can represent, through the appropriate channels and **participation**, important innovations to the SAR organisation that has decided to take advantage of the motivation and commitment of all its members.

Chapter 3. SAR QUALITY ASSURANCE PROGRAMMES

3.1. INTRODUCTION

3.1.1 Quality assurance programmes should focus on the identification and correction of deficiencies ("disconformities" for the ISO standard) before they give rise to disorderly, imprecise and, therefore, inefficient search and rescue operations of a high and unnecessary economic cost. They should be planned and implemented in such a way that they contribute to the efforts made by administrations to improve the quality of search and rescue services as a whole. This chapter contains some quality assurance strategies that should be developed to ensure the results of quality assurance programmes.

3.2. SCOPE AND OBJECTIVE

3.2.1 The objectives established to support SAR goals are normally expressed in terms of a given response time, the percentage of people in distress or goods under threat of being destroyed that are saved. These objectives are logical and relatively easy to quantify. Other objectives may also be used, such as avoiding injuries and material damage, or alleviating anxiety, although they are more difficult to measure.

3.2.2 One of the purposes of the quality assurance programme is to provide specific guidelines for reporting, investigating and resolving different types of events which affect the quality of SAR services. The programme should be designed to work in conjunction with ICAO standards and recommended practices, as well as with State regulations.

3.2.3 However, the first objective of the programme should be to avoid errors that might lead to a reduction in the number of lives saved, the adoption of wrong or late operational measures, confusion when following the instructions issued during operations, equipment failures, or incorrect or inadequate use of the resources available to the SAR system.

3.2.4 The second objective of a SAR quality assurance programme should be to improve the quality of the services provided by SAR units.

3.3. STRUCTURE

3.3.1 The structure of the SAR quality assurance programme depends on the size and composition of the SAR system. An acceptable and productive structure of this programme generally requires that SAR management designate or select an expert with sufficient experience in the search and rescue (SAR) field as to become the quality assurance specialist of the SAR unit (SAR QA). The SAR QA specialist will assume quality assurance (QA) responsibilities for the unit and report directly to the head of the SAR unit.

3.3.2 For larger SAR units, the head of the SAR unit will establish a SAR quality assurance department with various specialists and a sub-chief with sufficient SAR experience, who would take on quality assurance tasks and responsibilities for the unit and report directly to the head of the SAR unit.

3.4. IMPLEMENTATION AND RESPONSIBILITIES

3.4.1 For purposes of developing SAR quality assurance programmes, the ICAO NACC and SAM Regional Offices will provide assistance and advice to SAR service providers of the CAR/SAM Regions.

3.4.2 All CAR/SAM States/SAR providers should implement a SAR quality assurance programme, with documentation on the subject. The programme should explain its purpose, objectives and responsibilities. The State or SAR service provider and each SAR unit should establish such programme.

3.4.3 CAR/SAM States/SAR service providers should keep their National SAR QA Plans updated, and assess their effectiveness.

3.4.4 The heads of SAR units should be aware of, and be involved in, the operations/programmes of their SAR units so as to ensure the highest level of quality and efficiency.

3.4.5 All employees are responsible for maintaining the highest level of quality in their performance.

3.5. CONTENTS OF THE PROGRAMME

3.5.1 The SAR QA programme should establish methods to identify and correct shortcomings and deficiencies, and to recognise progress made in the following areas:

a) SAR system management

- SAR update training
- Improvement of aeronautical and SAR phraseology
- English proficiency
- SAR communications
- Study of reviews/conclusions of SAR incidents or missions
- Incentives/recognition
- List of appropriate operational practices
- Assessment of (oral and written) communications/instructions that have taken place in the course of SAR missions
- Training through communication or co-ordination exercises, as well as comprehensive or field exercises
- Lessons learned from personal anecdotes
- Periodic quality assurance reports for SAR units containing trends, customer feedback, evaluations, etc.
- Resolution of identified problems
- Incorporation of actual SAR mission or operation scenarios into the new training programmes
- Internal, national and regional SAR assessment programmes.

b) Teamwork

The following list may be used to promote teamwork within search and rescue organisations:

- Training on teamwork with air traffic service personnel
- Teamwork incentive/recognition programmes
- Roles of the different positions
- Proposals for improving the respective operational manuals of each SAR unit
- Training course for SAR operational supervisors
- Team meetings/reports
- Clearly communicate the expectations of all employees
- Troubleshooting and analyses and measures for problem resolution
- Proposals for improving the respective SAR operational plans.

c) Communications

The following list of ideas may be used to improve communications among all the employees, in order to create a climate conducive to the exchange of information:

- Meetings of all the personnel (all levels) to address QA matters of common interest
- Electronic bulletin board system
- Access to information *via* internet/intranet
- National database containing domestic and local SAR QA data
- Information bulletins
- SAR QA seminars, conferences and workshops
- Reports from international SAR organisations such as: the International Maritime Organization (IMO); COSPAS-SARSAT; INMARSAT, etc., and other safety reports of the industry.

d) Customer service/feedback

The following is a list of ideas to request feedback from SAR personnel and customers (internal/external) concerning the quality of the service provided by the SAR unit and its impact on other organisations, customers and individuals:

- Training programmes for pilots
- Internal and external customer surveys
- Interaction with other aviation-related organisations
- Performance evaluation during the duty shift of the SAR operator/operational supervisor of the unit
- Meetings between SAR personnel and that of enterprises/organisations/bodies that contribute to SAR
- Familiarisation trips
- Contact with customer associations (for example, local flight schools, airlines, aviation organisations, etc.)
- Safety seminars for pilots and groups engaged in rescue
- Survival seminars/courses.

Chapter 4. VERIFYING THE COMPETENCIES OF SAR PERSONNEL

4.1 INTRODUCTION

4.1.1 In order to improve 14the technical competencies of search and rescue services on an ongoing basis, individual technical training requirements for technical performance purposes shall be identified and met.

4.1.2 The verification of personnel competencies is intended to provide operational personnel and supervisors feedback from SAR supervisors and quality assurance officials/specialists regarding their competencies. This feedback should also be used to develop plans to improve competencies, as applicable.

4.2 RESPONSIBILITIES

4.2.1 The head of the SAR unit is responsible for establishing and maintaining competence standards in the SAR unit. The SAR authority shall formulate guidelines specifying the required level of knowledge, both theoretical and practical.

4.2.2 All of the operational personnel of the SAR unit shall be required to periodically demonstrate that their performance meets the required competence standards. The SAR competencies of each SAR operator and supervisor shall be verified.

4.2.3 In large SAR units, SAR personnel specialised in on-the-job supervision and personnel training and evaluation (officials/specialists in quality assurance of search and rescue services) should be hired to perform this task within the unit.. SAR quality assurance officials/specialists shall prepare personnel competence verification shifts so that all operational staff is regularly investigated.

4.2.4 It is suggested that competence verifications be made at least twice a year. Advance notice of the conduction of competence verifications shall be given to search and rescue operational personnel and supervisors so that they may be mentally and functionally prepared. A sample checklist for personnel competence verifications is shown in the **Appendix** to this chapter.

4.2.5 In small SAR units, the head of the SAR unit or whoever he/she designates, shall fulfill these tasks. However, where arrangements are less formal due to the size of the SAR unit and the number of personnel, they must make sure that competence verifications are complete and thorough.

4.2.6 The official quality assurance operational supervisor shall continuously evaluate personnel performance using both direct and indirect methods. Indirect methods may include remote monitoring, review of recordings, written documentation, observations by other supervisors, SAR quality assurance officers, etc.

4.2.7 If, upon verifying the competence of a SAR operator, it is found that he/she would benefit from individual competence-building training, the following references may be used as guidance to determine the type of training required:

a) CAR/SAM Regional Guidance Material for Search and Rescue Services Quality Assurance Programmes, Chapter 7 – Training programmes;

b) ICAO Doc 9731, International aeronautical and maritime search and rescue services manual, Volume I, Chapter 3 – Training, qualification, certification and exercises.

4.2.8 Matters concerning SAR personnel performance cover technical performance areas which might benefit from technical update training. These matters are not necessarily deficiency areas. A SAR operator may, in general, have an acceptable technical performance and, nevertheless, benefit from training on some particular skill or task.

4.2.9 Once completed the verification of an operator's competencies, the official quality assurance operational supervisor that conducted the verification shall discuss the results with the operator.

4.2.10 Although competence verifications are not intended to be graded as pass/fail or satisfactory/not satisfactory, there may be occasions in which the performance of a SAR operator is found not to be satisfactory. In such cases, the certification shall be suspended and the operator shall receive appropriate update training, followed by a re-grading process. Under no circumstance shall a person who has been rated as "not satisfactory" be allowed to keep on working without supervision. If, after a reasonable period of time, a SAR operator is not capable of passing the competence verification, all details pertaining to the not satisfactory grading shall be collected and sent to the administrative authority.

4.2.11 Each SAR unit shall review, at least once a year, all personnel competence verifications conducted, so as to identify recurring and major competence needs. The results of this review shall be reflected in a report to the head of the SAR unit for purposes of developing effective future training plans.

4.3 DOCUMENTATION

4.3.1 Each competence verification of a SAR operator shall be discussed with said operator and be duly documented in the corresponding training record.

Appendix

Sample checklist for conducting personnel proficiency checks

<table>
<tr><td colspan="4">PERSONNEL PROFICIENCY CHECK</td><td colspan="2">SAR Unit Name</td></tr>
<tr><td colspan="3">Name</td><td>Date</td><td colspan="2" rowspan="2">Position/Sector:</td></tr>
<tr><td>Weather
☐ VMC
☐ IMC
☐ Other</td><td>Workload
☐ Light
☐ Moderate
☐ Heavy</td><td>Complexity of SAR Case
☐ Not difficult
☐ Occasionally difficult
☐ Mostly difficult
☐ Very difficult</td><td></td></tr>
<tr><td colspan="3" rowspan="2">Purpose:
☐ Proficiency check ☐ Follow-up ☐ Other</td><td rowspan="2"></td><td colspan="2">Review period:</td></tr>
<tr><td>From:</td><td>To:</td></tr>
</table>

Performance category	Performance indicator	More than Satisfactory	Satisfactory	Needs Improvement	Unsatisfactory
A. Separation	1. Separation is ensured.				
	2. Safety alerts are provided.				
B. Coordination	3. Performs handoffs/point-outs.				
	4. Required coordinations are performed.				
C. Control judgment	5. Good control judgment is applied.				
	6. Priority of duties is understood.				
	7. Positive control is provided.				
	8. Effective traffic flow is maintained.				
D. Methods and procedures	9. Aircraft identity is maintained.				
	10. Strip posting is complete/correct.				
	11. Clearance delivery is complete/correct and timely.				
	12. LOAs/directives are adhered to.				
	13. Additional services are provided.				
	14. Rapidly recovers from equipment failures and emergencies.				
	15. Scans entire control environment.				
	16. Effective working speed is maintained.				
E. Equipment	17. Equipment status information is maintained.				
	18. Equipment capabilities are utilized/understood.				
F. Communication	19. Functions effectively as a team.				
	20. Communication is clear and concise.				
	21. Uses prescribed phraseology.				
	22. Makes only necessary transmissions.				
	23. Uses appropriate communications method.				
	24. Relief briefings are complete and accurate.				
G. Other					

Comments:
Recommendation for Improvement:
Signature of person conducting check: Date:
Personnel Comments:
This report has been Discussed with me Personnel's signature ____________________ Date ____________

Sample checklist for conducting SAR Mission Coordinator (SMC) proficiency checks

SAR MISSION COORDINATOR (SMC) PROFICIENCY CHECK				**Name of the SAR Unit**	
Name			Date		
Meteorological conditions in the search area ☐ VMC ☐ IMC ☐ Other	Workload ☐ Light ☐ Moderate ☐ Heavy	Complexity of SAR Case ☐ Not difficult ☐ Occasionally difficult ☐ Mostly difficult ☐ Very difficult			
Purpose: ☐ Proficiency check ☐ Follow-up ☐ Other				Review period: From:	To:

Performance Category	Performance Indicator	More than satisfactory	Reaches the level required	Has knowledge but needs improvement	Unsatisfactory
A. Reception of emergency alerts	1. Acknowledge receipt of emergency alerts, if necessary				
	2. Obtaining and assessment of all data on the emergency case				
	3. Determines the type of emergency equipment of the aircraft / disappeared vessel or in an emergency situation				
	4. Establishes personnel shift and/or through radio in appropriate frequencies to facilitate communications with SAR means				
	4. Verifies and keeps corresponding records of all procedures with a graph, if necessary				
B. Coordination of SAR services	5. Retransmits emergency alerts to RCC involved, if necessary				
	6. Delimits the area subject of search and decided the methods and means required				
	7. Designates the OSC (and ACO, if necessary), alert to SAR means and assigns the frequencies for communications in the search area				
	8. Organizes the delivery of instructions to SAR personnel affected to the search and further interrogation				
	9. Organizes the delivery of provisions for subsistence of survivors. If necessary				
	10. Informs the RCC Head of the search action plan				
	11. Coordinates the operation with adjacent RCC. When applicable				
C. Control criteria	12. Evaluates all the reports from any source and modifies the search action plan, if necessary.				
	13. Adopts previsions for the fuel provision of aircraft / vessels in long searches, organizes SAR personnel accommodation				
	14. Has positive control of the actions in course				
	15. Analyzes the order and result of events, in order to evaluate the need to recommend the RCC head to suspend the search				
D. Methods and procedures	16. Keeps in mind the RCC Operational Plan				

SAR MISSION COORDINATOR (SMC) PROFICIENCY CHECK		**Name of the SAR Unit**			
	17. Complies with letters of agreement / internal directives				
	18. Coordinates flight safety aspects for SAR aircraft with corresponding ATC units				
	19. Formulates the search action plan (and rescue plan, if applicable) assigns the search areas, sends the SAR means and designates the frequencies for communications in the accident scenario and watches for the compliance of instructions				
	20. Writes or takes necessary previsions to write reports on the running of operations				
	21. Expedites instructions in a timely, precisely and complete manner.				
	22. Permanently works with the OSC and makes sure to receive and assess all reports of the same and from the ACO (if case it has been designated)				
	23. Maintains an effective working rhythm				
	24. Releases SAR means in a timely manner when the assistance is no longer required.				
	25. Notifies and coordinates with accident investigative authorities and with security personnel the surveillance of the accident location.				
	26. If such were the case, notify the State of the aircraft / vessel registry in accordance with the established standards				
	27. Takes provisions for the writing of the final report on the results of the operation				
G. Others					

Comments:

Recommendations for the improvement:	
Signature of the person conducting check:	Date
SMC Comments:	
This report **has** **has not** been discussed with me	
SMC signature	Date

Chapter 5 – SEARCH AND RESCUE SERVICE EVALUATION PROGRAMME

5.1 INTRODUCTION

5.1.1 The standardisation of procedures and methods is essential for any service that has international commitments and which uses procedures affecting more than one unit. The degree of standardisation achieved is directly related to the proficiency with which individuals perform their tasks. This, in turn, determines the efficiency of the SAR service provided to users.

5.1.2 In search and rescue services, personal proficiency and the standardisation of procedures and methods are achieved and maintained through training, certification, verification of competencies, evaluations and audits and, more importantly, through the deliberate and conscientious participation of all SAR personnel.

5.1.3 This chapter deals with the need to carry out an ongoing evaluation of each SAR unit and of the SAR system in general. This task is normally performed by personnel which have been properly trained so as to understand all aspects of the organisation and which are charged with appraising personnel proficiency and with making a critical evaluation of SAR's general efficiency.

5.2 PURPOSE AND SCOPE OF THE EVALUATION

5.2.1 The SAR evaluation includes a review of each SAR unit, such as the search and rescue centre (RCC), the search and rescue sub-centre (RSC), or some other activity of the SAR, or an overall review of several units or of the whole domestic SAR system. The evaluation of the SAR units is necessary to guarantee that:

a) the service always be top quality; and

b) all units and staff apply criteria, standards, rules and procedures in the authorised manner.

Whatever the scope of the evaluation may be, it should be noted that some common objectives shall apply.

5.2.2 It must be kept in mind that evaluations must cover the management and implementation of SAR service procedures, while the "internal audit" is carried out to determine whether the quality management system complies with the provisions foreseen in the quality management requirements established by the organisation and whether it has been implemented and maintained in an efficient manner.

5.2.3 The audit programme must be planned taking into account the status and importance of the processes and areas to be audited; as well as the criteria, scope, frequency and methodology of audits. The selection of auditors and the conduction of audits must guarantee the objectivity and impartiality of the auditing process. Auditors may not audit their own performance.

5.2.4 SAR evaluation covers all or part of the following aspects:

a) Determining the standardisation, quality and suitability of services provided to users;
b) Making sure that operational procedures are consistent with the Letters of Agreement in force, and with domestic and international standards and legislation;
c) Determining and making recommendations regarding operational requirements;
d) Detecting any potentially unsafe operational procedure or practice, so as to permit the adoption of immediate corrective/preventive measures;
e) Detecting problem areas or deficiencies; determining their probable cause and recommending the immediate corrective/preventive measures as may deemed appropriate;
f) Examining the efficiency of communications and coordination among and within units; and
g) Examining the utilisation of staff, the work required in each position and unit payrolls, with a view to achieving the desired compatibility.

5.2.5 Once the SAR evaluation has been completed, the conclusions should be fully documented, making the relevant recommendations whenever changes are needed. The aspects requiring immediate correction should be reported and corrected as soon as possible, preferably before submitting the corresponding official report.

5.2.6 The management of the area being evaluated must make sure that action is taken without unjustified delay in order to correct the deficiencies detected and their causes. Follow-up activities must include verification of action taken, and reporting on the results of such verification.

5.3 PERFORMING THE EVALUATION

5.3.1 The designated staff should perform a periodic evaluation of the SAR, based on a minimum recommended frequency of at least once every two years. In those units where the evaluation team is part of the permanent staff, the evaluation should be an on-going process, particularly as regards personnel competence. Whenever necessary, it might be desirable to carry out interim evaluations of selected units, approximately midway between scheduled evaluations.

5.3.2 Before starting the SAR evaluation, it is common practice to notify the head or the person in charge of the unit involved. This person should obtain the assistance which might be required to properly conduct the evaluation, even getting in contact with other interested parties, such as agencies with which Letters of Agreement for the use of means and personnel during SAR operations have been signed. Perhaps it might also be necessary to organise consultations with the operators, other civil aviation groups or with military authorities. In this latter case, it might be necessary to give them advance notice of the nature of the aspects contemplated.

5.3.3 Once the SAR evaluation has been completed, a meeting should be called to report all important results and recommendations to the head or person in charge of the unit. The purpose of this meeting shall be to:

a) review the conclusions;
b) identify problem areas;
c) discuss other alternate solutions proposed;

d) appoint the person in charge of subsequent measures;
e) co-ordinate corrective/preventive measures; and
f) set provisional deadlines for completion of the measures deemed necessary.

5.3.4 Should there be the need to review some given aspect or function, special evaluations may need to be carried out at any point in time.

5.4 DOCUMENTATION

5.4.1 Once the evaluation of the SAR unit has been completed, the person in charge shall:

a) draft a report on each of the evaluated units which are part of the system;
b) prepare a written report on the in-flight test, as the case may be;
c) send the evaluation reports to the competent authorities.

5.4.2 The evaluation reports of the SAR units must be written as a narrative and include, at least, the data listed below with respect to each routine observation or evaluation:

a) a description of the deficiency or problem areas found;
b) recommendations for correcting the situation;
c) the agency, individual or persons in charge of implementing the subsequent measures, if applicable; and
d) the dates foreseen for the implementation of the necessary corrective measures.

5.4.3 The relevant sections of the evaluation report should be sent to units not belonging to the SAR, as the case may be, so that they may be duly advised and be able to adopt the required measures.

5.4.4 The SAR unit should notify the competent authority regarding the measures taken with respect to the problems found. This should preferably be done within the 30 days after receiving the report and then at regular intervals until all pending points have been resolved.

5.5 SEARCH AND RESCUE SERVICE EVALUATION PROCEDURES

5.5.1 This section offers standard procedures to evaluate compliance with ICAO SARPs as well as the specified guidelines and procedures at national and local SAR units within a State.

5.6 EVALUATION PROCESS

5.6.1 **Full evaluation of the SAR unit**

5.6.1.1 ***Preparation and notification***. A full evaluation of each of the SAR unit, using the checklist included in this Appendix to this chapter, must be carried out every two years. The SAR authority must notify the head of the SAR unit at least 30 days before carrying out a full evaluation. This notice may request data for the pre-evaluation review, and will request subjects of special interest for the evaluation.

5.6.1.2 ***Information meeting***. Should involve introducing the members of the team, and discussing the evaluation programme and activities with the head of the SAR unit and other staff related to the unit.

5.6.1.3 ***Conducting the evaluation***. The evaluation staff shall perform a full evaluation of the SAR unit through one or all of the following elements: -direct observations, operations room and/or monitoring the Operations Plan/SAR unit Operational Manual/data, attendance to staff meetings, observing training activities, reviewing administrative records, interviews/discussions and a review of previous SAR missions or exercise reports. If possible, items classified as not compliant should be discussed with the SAR unit staff to determine how much they know about the item. If a satisfactory answer is received, the item may be classified as satisfactory. If no satisfactory answer is received, the item must then be suitably classified. Interviews shall normally be held with the heads, supervisors, operation supervisors, and specialist staff of the SAR unit, SAR operators, etc. Additionally, representatives of agencies which contribute to the SAR service and who have letters of agreement signed with the SAR unit involved for the use of means, personnel and/or survival material, representatives of ATS units associated with the SAR unit, etc., may be interviewed.

5.6.1.4 ***Daily report meeting.*** The person acting as a leader will normally hold a daily meeting with the head of the SAR unit to report on the progress made with the evaluation.

5.6.1.5 ***Meeting to report on results***. The head of the SAR unit must be kept advised on the findings of the evaluating person/team once the evaluation is concluded. It is recommended that all available SAR unit personnel attend this results reporting meeting. At that time, or as soon as possible, a draft copy of the SAR evaluation report shall be delivered to the head of the SAR unit.

5.6.1.6 ***Review of the evaluation***. The leader of the evaluation team should deliver an evaluation review form to be filled in by the head of the SAR unit.

5.6.1.7 ***Re-identified items***. Items re-identified as “not satisfactory” in the evaluation of a SAR unit must be recorded under the same designation.

5.6.2 SAR follow-up evaluations

5.6.2.1 ***Preparation and notification***. Follow-up of SAR evaluations should normally be carried out unannounced or with a minimum notice of on-site evaluation, desktop audit or combination of both. These evaluations shall normally be carried out no less than six months after the date of the meeting reporting the results of the full evaluation of the SAR unit, or as may be determined by the SAR service authority. The head of the SAR unit may be requested to supply data for the pre-evaluation review. The on-site SAR follow-up evaluation must follow the same procedure as described in paragraphs 7.6.1.2 to 7.6.1.6.

5.6.2.2 ***Pending items***. Items previously classified as unsatisfactory should be considered as pending if the three-step closure procedure has not been carried out and/or the discrepancy can still be detected. Each item must be addressed in the evaluation report with an explanation as to why it had to be re-opened.

5.6.2.3 ***New items***. The new items identified during the SAR follow-up evaluation must be properly documented.

5.6.2.4 ***Closed items***. Items may be taken as closed when the discrepancy can no longer be detected, and:

a) the initial action adopted by the SAR unit to correct the discrepancy has been completed;

b) the action that has been taken for some period of time to make sure that the initial action has corrected the discrepancy has been completed; and

c) some action and/or programme has been implemented to make sure that the problem does not arise again.

5.6.3 **Special evaluations**

5.6.3.1 A special evaluation may be carried out whenever the SAR authority deems it necessary or upon request by the SAR unit.

5.6.4 **Evaluation reports**

5.6.4.1 ***Completion of the report***. The results of all evaluations must be documented so as to make sure that all the involved offices continue fully advised as regards the effectiveness of the search and rescue service system. All final reports must be completed and distributed within 30 days following the date of the meeting where the results were reported.

5.6.4.2 The SAR unit full evaluation reports should:

a) contain the results of the evaluations of regards the areas involved;
b) describe all the points which were reported; and
c) assign tracking control numbers to all the identified points.

<u>Example</u> of tracking control number of the SAR unit evaluation:

00-RC-XXXX-01D-FE
Legend

"00" refers to the year of the evaluation	"RC, RS" refer the type of SAR unit RC = RCC; RS = RSC, etc.
"XXXX" refers to the identification of the SAR unit	
"01" refers to the tracking number and "D" is the classification	"I" = unsatisfactory "S" = satisfactory
"FE" refers to the type of evaluation	"FE" = of the whole SAR unit "DA" = desktop audit "FU" = follow-up evaluation "SP" = special evaluation

5.6.4.3 ***Executive summaries***. Executive summaries of all SAR unit evaluations must be prepared.

5.6.5 **Response to SAR unit evaluations**

5.6.5.1 All items classified as unsatisfactory in SAR unit evaluations require a response which must comply with the three-step closure procedure: Corrective action, follow-up action and management control. Additionally, the following criterion applies:

a) **Action Plan**. Action plans for all items classified as unsatisfactory must be developed and made known to the corresponding SAR authority within 30 days following reception of the SAR unit final evaluation report;

b) **First response**. The head of the SAR unit must complete and send one first response to the SAR authority 60 days after the meeting where the results of the evaluation of the SAR unit were reported; and

c) **Second response**. The head of the SAR unit must complete and send the second response to the SAR authority 180 days after the meeting where the results of the evaluation of the SAR unit were reported and every 180 days henceforth, until all points have been closed.

APPENDIX
SAR UNIT ASSESSMENT CHECKLIST

SAR Unit: ____

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
A. ADMINISTRATION				
SAR Organization	1. Which official bodies have authority and responsibility to coordinate the aeronautical SAR services? 2. ¿Is the same body responsible to coordinate aeronautical and maritime SAR services? 3. Is there a national SAR committee, which coordinates SAR matters with other national official or private bodies and with SAR bodies of other States? 4. Does current organization meet SAR requirements?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I)
ICAO and States documents	1. Review availability and status of amendment (Annex 12, Doc. 9731 Parts I, II and III, SAR National Plan, Unit Plans of Operation, Manuals, guidelines, Circulars). 2. Are the documents updated?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		ICAO Regional Offices Manual

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
Status of differences to SARPS	1. Are there any differences with Annex 12? 2. ¿Has the state notified ICAO of these differences? 3. Have the differences been published in the AIP?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Annex 15 Manual de ICAO Regional Offices
Air Navigation Plan	1. Review the status of implementation of the CAR/SAM ANP in the SAR area.	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Annex 12 Chap. 2, para 2.5.1 and Note ANP CAR/SAM Doc. 9749
RAN CAR/SAM/3	1. Review the status of implementation of CAR/SAM/3 RAN Meeting Recommendations and Conclusions	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Report CAR/SAM/3 Doc- 9749
SAR personnel training	1. Does the RCC or RSC staff get training, qualification, titles or official certification? 2. Does SAR responsible body assess the status of training of personnel and does it take the necessary measures to correct the training needs detected?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I – Chap 3) Annex 12 Chap. 2, para. 2.1.1.3
B. OPERATIONS				

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
Capacity to attend responsibilities related to search and rescue	1. Are the units assigned to perform other tasks, which might detract from their ability to handle SAR responsibilities?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I Appendix H)
Operational Documentation	1. Does the unit have Plan of Operations duly updated, which provides guidance to comply with SAR situations foreseen in all the area under jurisdiction? 2. Is there an updated and accessible filing of permanent availability for SAR Unit personnel consultations with all SAR agreements with other adjacent RCC/RSC and/or with the SAR provider means?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Annex 12 Chap. 4, para. 4.2.1 until 4.2.4 inclusive Doc 9731- IAMSAR (Part II – Chap. 1, para. 1.5)
Operational Teamwork	1. Do you observe if SAR shift personnel work as a teamwork? 2. Is personnel foreseen to cover service shifts in the unit sufficient and is it ready to initiate and continue carrying out operational tasks on a 24-hours basis?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I – Chap. 2, para. 2.3.11) Annex 12 (Chap. 2, para 2.1.1 and para. 2.3.3
Operational Supervisor / SAR personnel	1. Is there an operational supervisor or a SAR staff in charge of the operational shift? 2. Is the supervisor / operator in charge trained to plan and coordinate SAR operations until the SMC takes over and/or perform other tasks that the SMC may assign during the development of a search or rescue?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I – Chap. 2, para. 2.3.11)

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
Communications available in the unit	1. Does the RCC have a two-way rapid and reliable communications with: (i) Associated ATS units; (ii) Associated RSC; (iii) The appropriate direction-finding and position-fixing stations; (iv) Where appropriate, coastal radio stations capable of alerting and communicating with surface vessels in the region; (v) Headquarters search and rescue (vi) All Maritime RCC located at the maritime SRR and RCC or joint RCC in adjacent SRR; (vii) The designated meteorological office or meteorological watch office; (viii) SAR Units (ix) Alerting post (x) The MCC servicing the SRR?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Annex 12 Chap. 2, para.2.4.1
	2. Does the RSC have two-way rapid and reliable communications with: (i) Adjacent RSC (ii) The meteorological office or meteorological watch office; (iii) Search and rescue units (iv) Alerting posts?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Annex 12 Chap. 2, para.2.4.2
	3. Does the national ground communication systems provide complete coverage of the jurisdictional area and with a rapid and reliable service?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I – Chap. 4, para. 4.5.7)
Communications Procedures	1. Is communications phraseology correctly applied? 2. Are communications procedures with SAR aircraft and ATS associated units correctly applied?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Annex 10 Annex 12 Chap. 2, para.2.3.3

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
Communications with SAR Units	1. Does the Unit Plan of Operations include procedures to establish communications with the civil search and rescue units provided by concurrent bodies?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I Appendix H, N° 37)
Coordination Procedures	1. Are coordination procedures adequately carried out with RCC/RSC, SAR units, and with the associated ATS unit?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Annex 12 Chap. 2, para.2.3.3
Operational Updating	1.How does the unit ensure that SAR personnel are updated in operational aspects? 2. Does SAR personnel from the main SAR contributory units receive training or participate in SAR exercises on a periodical basis? 3. Is there an official planning and assessment process regarding these exercises? 4. Does the unit have detailed information regarding the capacity (scope, number of persons that may be saved, alert time required to attend an alert, point of contact of the authority authorizing the support for the alert, etc) of all main search and rescue units within its jurisdictional area?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Annex 12 Chap. 4 Para. 4.4.1 Doc 9731- IAMSAR (Part I Appendix H)

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
Procedures related with medical evacuation	1. Are there any official procedures in the RCC/RSC, in order to make decisions on medical evacuation within its jurisdictional area? 2. Do SAR units have special equipment for medical evacuation? 3. Are there letters of agreement or other coordination tool in the RCC/RSC to receive medical care for all persons evacuated after a medical emergency?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I Appendix H)
Emergency Location Transmitter (ELT)	1. Does de RCC/RSC have instructions and means to have round the clock availability to the information contained in the ELT national registry operating in 406 MHz?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Report CAR/SAM/3 Doc- 9749 Doc 9731- IAMSAR (Part I, Chap. 4, Para.4.5.14 up to para. 4.5.22 inclusive
False alerts	1. Are there instructions to attend RCC/RSC false alerts? 2. Are there instructions to reduce RCC/RSC false alerts? 3. Is a registry kept and is the MCC serving the SRR informed?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I Appendix E)
C. OPERATIONAL SUPPORT				
Contingency Procedures	1. Are there any contingency procedures in case of a considerable failure of communications equipment?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		CAR/SAM REGIONAL GUIDANCE MANUAL FOR SEARCH AND RESCUE QUALITY ASSURANCE PROGRAMMES.
Documentation	1. Is there a complete registry (enough to the incident of all SAR events? 2. Is this registry consulted to analyse and improve the system? 3. Does the documentation available in the RCC/RSC satisfy the need for SAR personnel to take all necessary measures to comply with law requirements established?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I Appendix H)
D. QUALITY ASSURANCE				

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
SAR Quality Assurance Programme	1. Does the RCC/SRC have a quality assurance programme implemented? (a) Is there any guideline for such programme? (b) Has any SAR officer/SAR quality assurance specialist been designated?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		CAR/SAM REGIONAL GUIDANCE MANUAL FOR SEARCH AND RESCUE QUALITY ASSURANCE PROGRAMMES
Assessments	1. Are there any regional or national assessment programmes implemented? 2. If such were the case, which aspects do they assess? 3. How often are the assessments? 4. Do these assessments result in Action Plans and responsibility to apply the assessments?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Idem
E. TRAINING				
Certification and refreshment certification	1. Which is the training process and certification? 2. Who determines it?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I, Chap. 3)
Training tests	1. Is SAR staff required to demonstrate their performance? (a) Are there abilities tests carried out? (b) If so, how often? 2. Are there training courses? (a) Does the RCC/RSC have annual lists of requirements for training courses? (b) Who and how are training matters determined?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I, Chap. 3)

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
Reports to supervisors staff / SAR personnel	1. How are supervisors staff /SAR personnel informed on the changes in procedures? 2. When and who makes sure that all personnel have been informed?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I, Chap. 3)
Updating English refreshment courses	1. Is there any English course available to learn the English language? 2. How is any acceptable level of proficiency determined? 3. Are there any updating courses?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I, Chap. 3) Report CAR/SAM/3 Doc- 9749
F. EQUIPMENT AND FACILITIES				
Communications system	1. How reliable are communications (ground-ground, air-ground)? a) Aeronautical Fix Service (AFS) - AFTN - Speech Circuit b) Aeronautical Mobile Service (AMS) - VHF - HF 2. Are there procedures to compensate deficiencies? 3. How are SAR registries kept and maintained?	☐ Satisfactory ☐ Unsatisfactory ☐ Not applicable ☐ Not assessed		Doc 9731- IAMSAR (Part I, Chap. 4) (Part II, Chap. 2)

SUBJECT	ASPECTS TO BE ASSESSED OR QUESTIONS TO REPLIER	SITUATION	COMMENTS	ICAO Ref.
Location of the unit	1. Is the RCC/RSC located next to a FIC or an ACC so that the additional communications means may be reduced? 2. Do the dimensions of the locations assigned to the RCC/RSC satisfy the provision of SAR services? 3. What is the status of the RCC/RSC infrastructure? 4. Is there a new location required (indicate reasons, if affirmative) 5. Is there any general office equipment for tracks tracing, or charts showing the area of responsibility of the RCC/RSC and adjacent areas, file cabinets, etc? 6. Is there sufficient comfort contemplating the SAR personnel needs during operational shifts to cover 24-hours capacity (dining room, living room, wardrobe, toilettes, etc.?			Doc 9731- IAMSAR (Part I, Chap. 2, para. 2.3.8)

Assessment Team Name Organisation

Original signed by
Date:

Chapter 6 – QUALITY SERVICE IMPROVEMENT PROGRAMME

6.1 INTRODUCTION

6.1.1 SAR authorities should seek initiatives to improve the overall quality of the search and rescue services they provide. This chapter contains several initiatives that should be taken into account by SAR authorities to improve the quality of SAR.

6.2 PERIODIC REVIEWS OF SAR UNIT RECORDS

6.2.1 The quality assurance official/specialist of the SAR unit should periodically review the SAR mission report records and the time records kept in the operational guard log book and, if available, any voice communications recordings, in order to guarantee that the overall quality of search and rescue services rendered is maintained.

6.3 ICAO TERMINOLOGY FAMILIARISATION PROGRAMME

6.3.1 Administrative and operational tasks are carried out in the RCCs. The administrative tasks involve keeping the RCC in a stage of permanent preparedness. Operational tasks involve the efficient performance of an SAR operation or exercise, and thus are of a temporary nature. Said tasks correspond to the SMC, whose duties may be performed by the head of the RCC or other trained personnel of the RCC. Said personnel may include members of other official or private agencies for purposes of facilitating co-ordination in those events in which use is made of elements belonging to such services but which have no training or a constant relation with aeronautical communications.

6.3.2 In the case of this staff coming from other agencies, SAR authorities and/or units should implement a programme to make them familiar with ICAO phraseology. The implementation of programmes to improve the phraseology of a SAR unit will contribute to avoiding misinterpretation of the messages exchanged between the staff mentioned in the previous paragraph and the professional personnel of the aeronautical SAR. The results of this programme could improve the quality of the services and contribute to avoiding incidents during SAR operations. This may be achieved through random voice recording reviews, voice recording monitoring evaluations, or through direct observation. It is important to follow up on this programme in order to give some type of recognition to SAR unit staff showing outstanding use of phraseology or a significant improvement in the use of ICAO standard phraseology.

6.4 SAR USER SERVICE/FEEDBACK

6.4.1 It is very important to establish good communications among SAR authorities/SAR units and SAR system users. All SAR system users, whether from commercial airlines, business aircraft or general aviation, can provide valuable feedback. Feedback from other aviation departments, for instance airdrome offices and ATS units, and from ATS internal staff is equally important. This feedback can be obtained through surveys and may be used as a method to determine the quality of the services rendered by the SAR unit.

6.4.2 ***SAR quality assurance surveys***

6.4.2.1 SAR units should conduct an internal and external SAR quality assurance survey every year to obtain feedback on the services they provide. A sample SAR quality assurance survey for SAR personnel is shown in the **Appendix** to this chapter.

6.4.2.2 The data collected from these surveys must be analysed and validated, and the results made available to all SAR staff. Based on the review of the collected data, those issues affecting the quality of services should be identified and assigned an order of priority, and an action plan should be developed and implemented to apply these matters. Surveys from previous years could be used as a basis to determine how the SAR unit is doing as regards the quality of the search and rescue services provided.

6.5 PILOT USERS/SAR STAFF FORA

6.5.1 SAR authorities should organize pilot/SAR staff fora at least once a year. These fora can generate good relations and enhance communications between SAR authorities, pilots and SAR staff. The main objective of these fora is to link the pilot in the cockpit with the SAR controller so as to have a better understanding of the responsibilities and functions of each party. It is recommended that these fora not be organised as meetings and that no concrete action be taken. These fora may also be used by SAR authorities/units to introduce and explain information regarding local and domestic SAR system and procedures.

6.6 PARTICIPATION IN PILOT SAFETY SEMINARS

6.6.1 SAR authorities should participate in pilot safety seminars in an effort to submit information on the SAR system related to SAR quality assurance.

6.7 VISITS TO SAR UNITS BY PILOTS

6.7.1 Pilots should be encouraged to visit SAR units (RCC, RSC) and to familiarise themselves with the SAR system. In rare occasions, SAR facilities may be unable to receive visits due to the work load or to other reasons. Consequently, pilots should contact the SAR unit before the planned visit and report the number of people in the group, the time and date of the proposed visit, as well as the main interest of the group. With this information on hand, the SAR facility can prepare a programme and have someone available to guide the group within the unit.

6.8 SAR SYSTEM FAMILIARISATION/TRAINING FOR PILOTS

6.8.1 It is recommended that SAR authorities consider developing a SAR system training programme for pilots. The programme would be intended to train pilots on how to make the best use of the SAR system, its functions, responsibilities, benefits and available services.

6.9 FAMILIARISATION TRAINING FLIGHTS FOR SAR STAFF

6.9.1 SAR authorities should establish a programme with the airlines to have the SAR staff participate in familiarisation flights. SAR supervisors and operators should be encouraged to participate in these flights. This programme would allow the staff of SAR units to have first-hand experience of cockpit activities.

6.9.2 They should also establish a programme for the staff of the SAR unit to participate in familiarisation flights in the area of jurisdiction. In the course of these flights, the radio communication difficulties that arise (generally due to transmitter/receiver equipment range or terrain configuration) in navigation, meteorology, etc., should be tested. These flights should preferably be conducted on aircraft intended to provide support in search and rescue operations.

6.9.3 Familiarisation flights should be considered as skill training for SAR supervisors and operators.

6.10 RECOGNISING QUALITY PERFORMANCE

6.10.1 Positive performance and quality recognition is as important as identifying deficiencies. SAR personnel, individually or as a team, should receive recognition for rendering a high standard of performance and quality of service. It is therefore recommended that SAR authorities/units develop a programme aimed at recognising quality performance.

6.11 MEASURING SAR PERFORMANCE

6.11.1 It is important that SAR providers find ways to continuously improve the safety and efficiency of SAR operations in order to optimise performance in general. This section describes various ways by which SAR performance cay be measured.

6.11.2 The following factors must be taken into account when measuring the performance and the quality of search and rescue services provided:

6.11.3 **Safety**. Safety being the top priority, the number of accidents and incidents handled by the SAR should not be the only thing to be measured. Measurements must include the level of risk which exists during SAR operations for the materials and crews engaged in the search and/or rescue.

6.11.4 **Delay**. It is vital that utmost efforts be made to make sure that emergency alerts, independently of the communications channel used, get to the RCC/RSC with the least delay possible. It is also vital that there be no delays in alerting SAR units of an imminent coming into action.

6.11.5 **Prediction.** Is the variable measure of performance? For example: The predictable measures must be compared with the real times it takes the SAR unit to apply (implement) the Operations Plan as opposed to the optimum times expected from it.

6.11.6 **Flexibility.** Flexibility refers to the ability of SAR personnel to adapt SAR operations to the changing conditions that may arise during the course of said operations. Greater flexibility makes it possible to explore operational opportunities as they arise. This includes guiding search and rescue units to more favorable routes or minimising delays or cancellations in some scheduled SAR operations as a result of unforeseen events affecting capacity such as, for example, bad weather. Flexibility measures will make it possible to review the extent to which the training received by the staff of the SAR unit allows them to make dynamic operational decisions as a result of meteorological changes or operational conditions either before or during SAR unit operations.

6.11.7 **Efficiency.** Efficiency may be measured in terms of a flight deviating from an optimum flight routing. For example: An efficient routing would reduce direct costs of operation by optimising the flight path and eliminating excess flight time, route distance, use of fuel in non optimal velocities and altitudes, time of arrival to the search and/or rescue area, time of search, etc. Efficiency measurements should compare the actual flight path with the ideal path.

6.11.8 **Availability.** Availability in search and rescue services is an indicator of the reliability and quality of the SAR services provided. Failures in key systems may reduce (or annul) the capacity of the system, causing delays, diversion or cancellation of flights scheduled for search and rescue; total or partial lack of fuel and/or lubricants for the timely replenishment of SAR units; health facilities not ready to receive and care for casualties as the case may be, etc.; which increases the costs of SAR service, becomes an added burden to the SAR supplier or, as in the last example, the difference between life and death of a survivor evacuated from the accident site.

6.11.9 **Access**. Access to an airport or to the area designated for search or rescue may increase the value of performance measurements; as in the case of path efficiency, the value of access can increase through the measures agreed upon in this regard with ATC units to obtain the release of the airspace that is inaccessible for SAR operations, airport reduction or limitations of the airspace itself. Access measurements must include the ability of the SAR unit to coordinate passage of SAR air units through restricted areas, the availability and quality of preferred routes, and the skills of the ATS provider, the ATS system and the airport to meet the demands for use.

6.11.10 **Cost of the service**. At the international level, habit and practice stipulate that the State rendering the aeronautical and maritime SAR services shall finance them, even when the assistance given is at the request of some other agency, for example, the RCC of another State. Hence, petitions for reimbursement to the State that requested or received the services are not usually submitted. Thus, the SAR system must have some financial support. Usually, this support increases when the party responsible for the SAR service can explain and demonstrate the importance of the SAR system through some efficient dissemination of the main activities it conducts. Therefore, measuring SAR performance based on its successes and failures acquires great importance for its growth based on what is required from it, while offering valuable information to assess efficiency and to determine the best way to improve.

SAR QUALITY ASSURANCE INTERNAL SAR UNIT SURVEY

(To be filled out by SAR personnel)

“Name of SAR unit” **QUALITY OF SEARCH AND RESCUE SERVICE EMPLOYEE SURVEY”**

“Name of SAR unit” is very interested in obtaining your feedback on the quality of services that you provide to users of the system and if all the tools you need are available to provide these services. Your comments are very important to us and we would like to thank you in advance for taking the time to complete this survey.

1. Please provide us with the following information (Optional):

Name:
Position:

2. How do you rate the overall quality of search and rescue services provided by your SAR unit?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

3. How do you rate the quality of equipment that you work with?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

4. How do you rate the type of training (includes proficiency training, refresher training, initial training, etc.) you received?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

5. How do you rate the working environment?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

6. How do you rate the attitude of SAR personnel as it pertains to professionalism and friendliness?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

7. How do you rate the use of proper aeronautical phraseology in your SAR unit?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

8. How do you rate the airspace and ATC procedures of your ATS unit?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

9. How do you rate the availability and quality of local, national, and ICAO directives?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

10. How do you rate the workload distribution (is the workload distributed evenly?)?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

11. How do you rate the quality and timeliness of briefings (new procedures, changes to procedures, etc.)?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

12. How do you rate the communications between SAR personnel (between personnel and personnel, supervisors and personnel, management and personnel, etc.)?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

13. How do you rate your job satisfaction in your current position?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

14. Please share with us any comments and/or suggestions pertaining to your SAR unit you believe that may need improvement.

Comments/Suggestions:

Chapter 7. COMPETENCE-BUILDING TRAINING PROGRAMMES

7.1 INTRODUCTION

7.1.1 There is a need for competence-building training in each SAR unit in order to maintain and update the knowledge and skills required to apply search and rescue procedures in a safe and efficient manner. This training includes update and supplementary training, improvement of skills, and corrective training.

7.1.2 Training can be achieved in different ways, using both internal and external methods (local competence-building). The most practical and efficient way of providing competence-building training is by developing a local competence-building training programme. This concept involves sending a limited number of employees to external training and, upon returning to the unit, they would train their colleagues in the areas in which they received training. This concept is known as "training the trainer" and would be useful to assist SAR authorities to complete their competence-building training programmes as required. This type of training may include training videos, discussion/summary of operational procedures, emergency procedures, co-ordination procedures, SAR incidents, contingency procedures, etc. Consideration should be given to preparing a room within the SAR unit to be used for competence-building training. This room must have the appropriate training equipment, that is, video cassette, TV set, white boards for markers, aviation charts, local, national and ICAO reference material, etc.

7.2 COMPETENCE-BUILDING TRAINING

7.2.1 Competence building should be a requirement for all operational personnel, as well as for support personnel that need to maintain their operational level of knowledge. This training is intended to maintain and update the knowledge and skills required for safe and efficient implementation of search and rescue procedures.

7.2.2 Competence-building needs will vary from one SAR unit to the other. Therefore, training should be adjusted to accommodate the requirements and needs of each unit.

7.2.3 Competence-building may include training on issues mandated by SAR authorities and local SAR units.

7.2.4 This type of training programme must be described in the directives for the SAR unit.

7.2.5 SAR authorities/units must make sure they apply an annual mandatory competence-building training programme and that competencies are acquired.

7.2.6 All training related to competence-building must be documented in the personal training record of each SAR official.

7.3 ***Update training***. Each SAR unit must establish an annual update training programme. SAR authorities, managers and supervisors must stress the fact that update training is intended to improve competencies and not to assess performance.

7.3.1 This programme should include, but not be limited to, training in the following topics:

a) ***Unusual situations***, such as adverse weather conditions, on-board equipment failure, pilot's lack of knowledge of the route, or other type of contingencies (for improved learning, training for emergencies must be based on actual incidents);
b) ***Barely used procedures***, for example: cases and planning of parachute jumping, communication with the public and the media, communication with relatives, scope of electronic scanning, interview techniques, rescue procedures, AMVER, receiving medical advice, etc.;
c) SAR agreements,
d) Data collection and evaluation;
e) Allocation of SAR resources;
f) Documentation of incidents;
g) Completion of instruction forms/questionnaires for SAR units;
h) Identification of elements of reference;
i) Risk assessment;
j) SAR communications;
k) End of SAR operations;
l) Emergency phases, SAR stages and components;
m) SAR resource capabilities;
n) SAR technology;
o) Search configurations;
p) Search planning;
q) Selection of SAR units;
r) Survival equipment;
s) Scope of visual scanning;
t) Water currents;
u) Aircraft performance and characteristics;
v) Co-ordination procedures;
w) Civil/militar coordination and joint use of airspace procedures;
x) Aeronautical phraseology;
y) Fire/life safety procedures at the SAR unit;
z) Other issues identified and reported by SAR authorities or local SAR units.

7.4 ***Supplementary training***. Operational personnel must complete the supplementary training prior to the implementation of new/revised procedures, regulations or equipment.

7.5 ***Skill-improvement training***. Training provided by the SAR operation supervisor when a need for improving the skills of a SAR operator is identified. When this happens:

a) the SAR operator must be notified in writing as to the skills in which he/she needs a higher level of training; and
b) the SAR operational supervisor, in co-operation with the operator, is responsible for developing the training to be provided to the SAR operator. The methods and contents will be tailored to the individual needs and will include laboratory scenarios, classroom training, computer lessons and on-the-job training. The SAR operational supervisor will determine the most effective method.

7.6 ***Remedial training***. Training aimed at correcting specific performance deficiencies, such as:

a) a SAR operator who makes mistakes due to a performance deficiency;
b) training provided following bad performance, which should be documented as remedial training.

7.6.1 The SAR controller shall be notified in writing about the topics to be covered and the reasons.

7.6.2 The SAR operator shall have reasonable opportunity to make comments about his/her performance during remedial training.

7.6.3 The methods and contents must be designed to meet the needs of the SAR controller and may include simulated scenarios with theoretical and/or practical laboratory exercises, classroom training and on-the-job training. The SAR operational supervisor must identify the most effective method.

Chapter 8. HUMAN FACTORS

8.1 The human factor is the essential element for achieving efficiency in any organization. Technology facilitates search and rescue tasks and, in many cases, is indispensable for the successful implementation of SAR operations. But the proper use of the tools which technology puts at SAR's disposal depends on the level of competence of the user is. It is the quality of human resources which makes the difference as regards performance. Thus, to optimise performance, one must try to establish an <u>adequate professional and work environment</u>.

8.2 Exclusively at the professional level, it should be stressed that an aspect which favours performance is <u>motivation.</u> From this point of view, motivation implies the provision of the means needed for professional development and for acquiring the capabilities required by the position. It also implies getting the person involved in achieving an aim which trascends mere individual interests. This can be done by creating a healthy spirit of teamwork and professional identity. The best of an individual emerges when committing to a project or an idea which will be of benefit to society. It is a matter of placing at the disposal of that individual all the means which, from a personal outlook, are required for the achievement of some general objectives.

8.3 From the above it is possible to conclude that a demanding training programme is a basic ingredient for motivation, strictly from its professional side. Furthermore, in activities with an implicit risk, training and professional improve the level of safety. This is an unquestionable reality and is applicable to search and rescue organisations since, due to the nature of their functions and the repercussions which SAR incidents may have, they are under the obligation of not only planning their activities in detail but also of improve all the knowledge acquired in their training as well as the response capabilities of the staff in charge of handling emergencies.

8.4 On the other hand, public opinion in developed societies demands the highest degree of protection and efficiency from emergency services, being quite sensitive to any errors deriving from lack of foresight, deficient planning or poor use of available resources.

8.5 RCCs exercise management and co-ordination functions which require a large diversity of skills as well as a resolute attitude. Their staff has to be <u>highly specialised</u> and, hence, requires theoretical and practical skills training and updating in SAR subjects, ratified through qualification procedures. The international nature of air and maritime activities and, consequently, of SAR activities, also demands <u>certifications proving the levels of competence</u>.

8.6 In a SAR system, administrative and support actions are combined with operational functions. Personnel organisation involves covering all the SAR organisation positions, deciding on personnel requirements and then hiring, selecting, evaluating, promoting, paying and training the necessary staff. Personnel organisation must be closely related to the organisation of functions and positions.

8.7 Staff **selection** should be quite strict, for the new members of the organisation should have skills consistent with the philosophy of Quality Management (teamwork, responsibility, esprit de corps and commitment). It is convenient for people coming into an organisation to show or have shown great capacity to resolve changing situations, as well as a series of particular skills and attitudes (ability to work as a team, responsibility, willingness to participate).

8.8 The **training** area is also fundamental to have a SAR staff which has been duly trained to participate and to introduce quality improvements into the system. If they do not have the necessary knowledge, they will be unable to make their contribution. The fact that personnel is hired means that an effort has been made to have those chosen achieve the desired objectives. The time and the training dedicated to the team and its development should be considered an investment and not an economic cost. The need for training applies both to SAR staff (supervisors and SAR operators) as well as to top and middle management of the service (SAR director, managers, heads of SAR units, etc.), not only in quality improvement methods but also in the processes and procedures of the organisation, and in an indoctrination aiming at a total quality culture.

8.9 Lack of training will make it difficult for participation programmes, which are a basic element in Quality Management, to prevail. Adequate training of employees constitutes the basis for a participatory attitude. Furthermore, without such basic knowledge, the SAR staff will not be able to do a good job. The knowledge they must have is that related to interpersonal and group relations, statistical/quality analysis and awareness of the objective of the SAR service, and the training which the position may demand.

8.10 All of the members of the organisation should receive initial training on Quality Management basics to facilitate their understanding of it and to encourage them to participate. It must be pointed out that the members of the organisation must be trained and increase their skills as regards communications, teamwork and participation at meetings.

8.11 The staff of the SAR system requires training if it is to be responsible for quality. Quality training and participation are closely linked. All members of a system are responsible for improving processes, hence; the training provided must be such that suggestions can be contributed from every position. What is involved is for every person to have a sufficiently broad view so as to improve the whole process, and not be limited to only the specific position of the individual, something which can be achieved through teamwork.

8.12 **Communications** should be taken as just another human resource department task. Methods should be devised to see to it that any information which might be useful for people gets to them so that they can do their jobs properly, and to adapt to the organisational culture. Employee participation requires not only training but information as well.

8.13 Communicating positive results to the staff improves their morale and their motivation, while hearing about the negative ones should encourage their efforts to correct them. Linking participation to quality emphasises the importance of establishing good communication channels throughout the SAR system. To improve quality, SAR staff needs information about its work, its results and its contributions. Thanks to such information, people improve their knowledge and can make suggestions which, through the appropriate participatory channels, may represent major innovations for any enterprise which may have decided to take advantage of the collective intelligence of its entire staff.

8.14 In human resource management under the Quality Management system, it is fundamental to encourage the **participation** of all members of the organisation. Participation, or “empowerment”, means encouraging, favouring and rewarding the SAR staff for behaving at all times in the way it deems convenient to achieve the goals of the SAR service. This means that, for the staff to participate, it has to receive the necessary instructions to make decisions affecting organisational management and results, receive information on the results, information enabling them to understand and contribute to those results and the rewards based on those results.

8.15 For real participation, the staff must receive adequate amounts of these four factors. Only thus will the staff be able to see a direct relationship between its efforts and the results of the organisation. For the participation to be effective, aspects such as the importance of the leadership style must be taken into account. The enterprises which use it consider their employees as professionals capable of fulfilling their tasks in a precise and effective way, and thus delegate on them a large measure of responsibility and allowing them to participate in the decision-making process.

Automation focused on the human element

8.16 A technology-oriented approach automates all possible functions and lets the human element handle the rest. This places the operator in the role of an automation custodian. A human-focused approach offers the operator an automated assistance that helps him/her save time and effort, since automation provides support to, but does not direct, the operator in the performance of his/her tasks. The three high-level automation objectives are: Usefulness, Operational Convenience and Acceptance by the Labour Force.

Status awareness

8.17 Status awareness is defined as perceiving the elements making up the environment within a volume of time and space, understanding their meaning, and projecting their condition in the near future. The elements of status awareness in the SAR service are extremely dynamic and are subject to changes ranging from subtle to significant, which can occur in short notice and which can affect, or do affect, the performance of an operator at a given moment. For example:

- Personal factors
- Meteorological conditions
- Airport infrastructure
- Time needed to get the SAR elements ready
- Availability of rescue personnel
- Work environment
- Geographical locations and preparedness for replenishment of SAR elements
- Aircraft performance
- Rescue operations equipment
- Adjacent units

Error management

8.18 Error management has two components: error reduction and error contention. Error reduction covers measures designed to limit the occurrence of errors. Error contention measures are designed to limit the adverse consequences of any errors which may still occur.

8.19 Error management includes the following:

- Measures to minimise the risk of individual and work team errors;
- Measures to reduce the vulnerability to error of certain tasks or task elements;
- Measures to discover, evaluate and then eliminate the factors which cause errors in the workplace;

- Measures to diagnose organisational aspects which create error-generating factors for the individual, the work team, the task and the workplace;
- Measures to improve troubleshooting;
- Measures to increase error tolerance by the workplace and the system;
- Measures to make sure that latent conditions are visible to those operating and managing the system;
- Measures to improve the intrinsic resistance of the organisation to human fallibility.

8.20 There is a relation among the concepts presented. Application of the concept of Automation centered on the human element will increase the Status Awareness of the SAR operator, which, in turn, becomes a component of the Error Management programme. SAR operators that keep a high degree of Status Awareness are more likely to detect errors and to control their consequences.

8.21 In an effort to further explain human factors related to the work of the SAR operator, the **Appendix** to this Chapter includes an extract of a document entitled "Human Factors for the Air Traffic Control Specialist: Handbook for the User's Brain", published by the United States Federal Aviation Administration in November 1995. Although the document was developed for air traffic controllers, it does include some of the results of research studies on human factors, as well as additional information useful for SAR operators, written in a succinct and easy-to-read format.

8.22 The topics included are: controller-pilot voice communications, memory, fatigue, and the effects of stress on data processing. These recommended techniques aim at helping to reduce the probability of error in voice communications, by remembering specific information, identifying signs of stress which could affect performance, and reducing fatigue.

The human factor and SAR training

8.23 On the other hand, the IAMSAR manual emphasises RCC personnel training and improving professionalism. It stipulates that the head of the SAR service is responsible for the formulation of training programmes for SAR personnel, so that it may reach and maintain a high level of competence. Stressing the above, it states that the directors of the service must make sure that said personnel is as mature and as competent as required to perform the tasks which may be assigned to it.

Appendix

QUALIFICATION OF SAR PERSONNEL

INFORMATION AND CONCLUSIONS ABOUT RCC PRACTICES BASED ON SEVERAL STUDIES CONDUCTED IN THE UNITED STATES

1. **Background**

1.1. To ensure that SAR services endure and improve, the U.S. Coast Guard has conducted studies in recent years that have indicated typical traits of high-performing rescue coordination centers (RCCs) and rescue sub-centers (RSCs). This paper discusses some of these traits.

1.2. The U.S. is addressing shortfalls, especially with regard to perishable skills, excessive workload, recurrent training, and technical and communications capabilities. In this paper we offer conclusions that may be of interest to other SAR authorities as well. Our investigation has been supported in part by other countries as is indicated below.

1.3. RCCs operated by the U.S. Coast Guard are unlike typical international RCCs in some ways. Our RCCs are actually multi-mission command centers that handle a full range of law enforcement and marine safety functions, and are staffed mainly by military officer and enlisted personnel on three-year tours. Communications watches are handled outside the RCCs.

1.4. The following studies examined RCC staff selection and retention, SAR training, staff qualification and recertification, tasks assigned, and workload expectations:

1.4.1. S/V MORNING DEW Case Study: involved the sinking of a sailing vessel off the north jetty of Charleston Harbor, South Carolina in December 1997 that claimed the lives of four persons.

1.4.2. 1999 Command Center Improvement Study: included a resident assessment of work processes and problems at one RCC and one RSC to assess the impact of growing non-SAR workload, since our RCCs are actually multi-mission command centers.

1.4.3. 2001 SAR Mission Coordinator (SMC) Front End Analysis (FEA): intended to help understand the actions and outcomes of accomplished SMCs.

1.4.4. 2002 Research and Development Report on Human Performance for Command Centers: examined command center performance from a human factors and performance perspective.

1.4.5. 2002 Report on Fatigue and Endurance: highlighted workforce and workload concerns associated with the Egypt Air 990 disaster.

1.4.6. 2003 RCC Benchmarking Study: examined the best practices of selected foreign joint or maritime RCCs. Australia (JRCC-civilian), Canada (JRCC-military and civilian), Hong Kong (MRCC-civilian), the Netherlands (JRCC-civilian), Sweden (JRCC-civilian), and the UK (MRCC-mainly civilian) assisted with this study.

1.5. These studies helped the U.S. to identify areas in which we would like to improve, including:

a) Knowledge and skills for all aspects of SMC duties
b) Refresher training
c) Proficiency in all aspects of search planning software
d) Understanding of search theory
e) Available training time
f) Multi-tasking requirements
g) Staffing levels
h) Standards and policies
i) Technical and communications capabilities
j) Administrative workload
k) Command briefings
l) Length of watches
m) Sleep and sleep/wake cycles

1.6. One study noted that multi-tasking could lead to chronic fatigue and mistakes. Multi-tasking can seriously disrupt integrative and decision-making processes needed to manage a SAR case. Multi-tasking is actually a sequence of serial events rather than work being done in parallel. When attention is diverted from one task to another, performance in both tasks degrades. Attention can be diverted by activities such as administrative tasks, answering non-SAR phone calls, monitoring RCC entrances, fatigue and noise. Attention can be better sustained by limiting the number of cases handled by a single person, adding a supervisor during high caseloads to maintain the big picture, and assigning an extra person to handle non-SAR tasks. A prevalent view is that good staff can multi-task; however, humans can only attend to one task at a time.

1.7. The following list indicates some types of remedial actions that the U.S. has taken or has planned consequential to the studies indicated above:

a) Include some civilian RCC staffing
b) Establish an RCC Standardization Team
c) Standardize common qualification, planning and decision-making processes
d) Standardize SAR checklists
e) Improve the RCC personnel selection process
f) Identify and centralize specialized system skills that require frequent practice
g) Increase the grade levels of enlisted and officer military staff
h) Increase the RCC staffing per watch position
i) Reduce watches from 24 hours to 12 hours
j) Make reference materials available online
k) Revise SAR School class schedule so new staff can attend prior to reporting to the RCC
l) Increase SAR School instructor staff
m) Revise SAR School curriculum to account for additional decision-making skills
n) Develop standard job aids for SAR mission coordinators (SMCs)

o) Develop web-based search planning training to enable 24/7 practice and refresher training
p) Limit the number of active SAR cases worked by a single person to two
q) Provide assistance with active cases at night between 0200-0600 hours
r) Make staff available to augment the watch during times of high operational tempo

1.8. The studies have also led to creation of an integrated distress response communications system called "Rescue 21" to modernize the entire coastal communications infrastructure, and the SAR School curriculum is being revised to account for this new technology.

1.9. A Standardization Team has been established (as an extension of our National SAR School) that visits every RCC and RSC every 18 months to ensure that standard policies and procedures are being followed and to test the search planning knowledge and skills of the RCC staff.

2. **Analysis**

2.1. The following paragraphs based on the studies indicated above (especially the Benchmarking Study) discuss some RCC practices that contribute to optimal proficiency, professionalism and accomplishment of the SAR mission.

2.2. *Optimal RCC staffing seems to be 7 + 1 per watch position.* At a minimum, 6 + 1 is warranted if 8 or 12-hour watches are stood. This issue is independent of the number of watch positions needed; both must be adequate. The term "+1" indicates a supervisor available to assist the watch during surge operations. Based on workload assessments conducted by the U.S. Coast Guard Research and Development Center, an RCC with only two watch positions should have 7 + 1 (or at least 6 + 1) staffing for both positions, except that an RCC with a low caseload might be able to share a supervisor between two watch positions with comparable duties. If staffing is lower than this, say 5 + 1, then the RCC staff should definitely not have any non-SAR or extra administrative duties assigned. Four of the six countries participating in the Benchmarking Study have 7 + 1 staffing standards. Staffing should be such that ample time off watch can be provided for leave, training, sickness, etc.

2.3. *RCCs should be staffed so that no person stands more than a 12-hour watch.* Longer watches lead to fatigue and degraded ability to perform SAR duties. All of the RCCs in the Benchmarking Study stand either 8 or 12-hour watches with 2 or 3 staff on duty at all times.

2.4. *Typical initial RCC formal training should be two months or more, and initial on-the-job training should be 7 months or more.* These durations were the averages for the six RCCs involved in the Benchmarking Study. Many countries provide all or part of their formal SAR training either by sending RCC staff to training institutions in other countries, or by using graduates of such schools to train other staff. The needed formal training may vary with relevant experience levels of new staff, and on-the-job training may be longer if RCC staff also performs primary duties in addition to SAR. One to three weeks of formal training is typically devoted to communications, with three weeks provided for RCCs that perform their own communications watches. Note that hiring of master mariners or air traffic controllers as RCC staff is a common practice of the RCCs of the six countries previously mentioned, and the average RCC experience level is ten years.

2.5. *SAR training should include several days of simulations and exercises.* Ideal facilities for these will include full-scale mock-ups of an actual RCC facility and computers for each person in the classroom. Students usually consider simulations and exercises to be the most effective and meaningful portions of a course. Computers at desks should be used to enable students to practice skills, as they would have to on watch, as soon as they are taught. RCC mock-ups should include real equipment as much as possible.

2.6. *Provisions should be made for recurrent training and re-certification of RCC staff.* Time must be provided to practice SAR proficiency skills. Adequate staffing enables some personnel to receive refresher training outside of their normal watch. Web-based training modules can be used at any time as an extension of SAR training institutions. Such training should keep the staff proficient in determining drift and in use of environmental data, and can include interactivity, immediate feedback, frequently asked questions, practice exercises, and threaded discussions. Annual SAR proficiency tests that include written exams and use of search planning software help with maintenance of important search planning proficiency, which is a technical and fleeting skill. Solving lengthy SAR simulation problems on watch may contribute to fatigue that could affect performance later on watch for an actual SAR case. An RCC Halifax risk-based work review concluded that generally 25% of an SMC’s time is required for skill maintenance and updating.

2.7. *Make SAR the only mission of an RCC or RSC.* RCC and RSC staff should not be overburdened with non-SAR and administrative tasks that reduce their vigilance to the SAR mission. At a minimum, an appropriate number of the RCC staff should be SAR experts, not multi-mission managers. For the obvious reason, RCC personnel need to be true SAR professionals, not just fairly good at handling a variety of missions.

2.8. *Steps should be taken to help maintain vigilance and proficiency on communications watches.* Vigilance is the ability to detect, say, a potential distress call out of radio background chatter or out of a large volume of non-distress traffic. Studies have shown that vigilance begins to degrade after only 20 minutes on a radio watch and declines with fatigue, performance of additional unrelated tasks, decrease in the signal-to-noise ratio, low light conditions, and as more channels or antennae sites are monitored.

2.9. Distress call watches should normally be limited to two hours. A person coordinating a SAR case should not also be responsible for maintaining a communications watch, or for answering non-SAR related phone calls during high tempo operations.

2.10. Background noise of 70 dB is disruptive to conversation and levels above 80dB seriously degrade concentration; use of headsets instead of loudspeakers and a sound-absorbing environment can help reduce noise.

2.11. Attempting to work during a normal sleep period degrades performance. Distress calls are more likely to be missed during the period from 0200-0600 when people are most challenged to stay alert; more rest outside this time or more assistance during this time may help.

2.12. Special diligence should be exercised when new equipment is introduced to ensure that use of the equipment is thoroughly understood.

APPENDIX C

Resolution A36-13: Consolidated statement of continuing ICAO policies and associated practices related specifically to air navigation

Whereas in Resolution A15-9 the Assembly resolved to adopt in each session for which a Technical Commission is established a consolidated statement of continuing policies related specifically to air navigation up to date as at the end of that session;

Whereas a statement of continuing policies and associated practices related specifically to air navigation as they existed at the end of the 35th Session of the Assembly was adopted by the Assembly in Resolution A35-14, Appendices A to X inclusive;

Whereas the Assembly has reviewed proposals by the Council for the amendment of the statement of continuing policies and associated practices in Resolution A35-14, Appendices A to X inclusive, and has amended the statement to reflect the decisions taken during the 36th Session; and Whereas the statement of continuing policies in Resolution A35-14 is hereby superseded;

The Assembly:

1. Resolves that:

   a) the Appendices attached to this resolution constitute the consolidated statement of continuing air navigation policies and associated practices of the Organization as they exist at the close of the 36th Session of the Assembly; and

   b) the practices associated with the individual policies in the appendices constitute guidance intended to facilitate and ensure implementation of the respective policies; and

2. Declares that this resolution supersedes ResolutionA35-14 with its Appendices A to X inclusive.

…………..

APPENDIX H of Resolution A36-13

Aviation training

Whereas satisfactory provision and operation of ground facilities and services and implementation of SARPs and PANS are dependent upon a high standard of personnel training;

Whereas difficulties are being experienced by Contracting States in these matters owing to a lack of adequately trained personnel;

Whereas special effort is required to foster a high standard of personnel training and to assist Contracting States in meeting their training needs; and

Whereas training seminars conducted by the Organization are an effective means of promoting common understanding and uniform application of SARPs and PANS;

The Assembly resolves that:

1. Contracting States shall be encouraged and assisted in the maintenance of high standards of training of aviation personnel and particularly those employed in the provision and operation of services and facilities for international air navigation. To this end, as a part of its regular work programme, the Organization shall carry out a continuing training programme which is referred to as the ICAO aviation training programme*; and

2. the ICAO aviation training programme shall be governed by the following principles:

a) aviation training is the responsibility of Contracting States;

b) the Organization should place the highest priority on the establishment of safety-and security-related programmes;

c) mutual assistance among Contracting States in the training of aviation personnel should be encouraged and facilitated, particularly in those matters where the lack of adequate training may adversely affect the safety, security or regularity of international air navigation;

d) the Organization should advise Contracting States on the operational oversight of training facilities; and

e) the Organization should not participate in the operation of training facilities but should encourage and advise operators of such facilities.

Associated practices

1. Through the development of specifications and guidance material, the conduct of training seminars, and by direct advice and consultation, the Council should assist Contracting States to:

a) standardize, as far as practicable, the curricula, methods and content of training courses and establish adequate examination and licensing provisions;

b) bring levels of accomplishment into line with international Standards; and

c) employ the criteria referred to in a) and b) above so as to bring about greater uniformity in operating practices and procedures.

2. Continuing attention should be given to the establishment of specialized and advanced training courses when needed to provide the skills required to install, operate and maintain facilities and services.

3. The Council should encourage the Contracting States to establish requirements for:

a) on-the-job training, including familiarization with relevant operating conditions, for personnel who, after completion of their basic training, require practical experience under actual operating conditions before being assigned to positions of responsibility in operational posts; in this regard States' attention should be invited to the possibility of drawing fully upon the resources of the various technical cooperation and assistance programmes; and

b) periodic refresher training particularly when new equipment, procedures or techniques are introduced.

4. The Council should request the Contracting States to provide, for dissemination to other States, information on the types of aeronautical courses they sponsor or are otherwise available in their States to which students are accepted from other States, including the address to which enquiries may be sent for additional details. Similarly, the Council should make available to Contracting States all pertinent information concerning training establishments assisted through ICAO that admit students from other countries.

5. The Council should urge Contracting States to make the maximum practicable use of training centres in their area for training their aviation personnel in fields where there are no corresponding national schools. To this end, the Council should encourage States to establish favourable conditions for attendance by nationals of other States in the area.

APPENDIX D

Training in the communications area

- Course on aeronautical applications over IP

  Suggested curriculum:

  Introduction
  - Basic networking concepts
  - ISO reference model
  - Communications protocol architecture
  - TCP/IP model and architecture

  Physical layer protocols
  - Types of transmission media
  - Cable specification
  - Types of cables and connectors
  - TIA/EIA protocol
  - Direct cable – crossover cable – rollover
  - Fiber optics, radio link, VSAT
  - LAN and WAN protocols

  Link layer protocols
  - General description of WAN protocols: HDLC, X.25, Frame Relay, etc.
  - General description of LAN protocols: CSMA/CD, LAPB, LAPD, LLC, etc.
  - IEEE 802.XX family
  - MAC address
  - Network layer protocols (IP)
  - Classes of IP addresses
  - Network subdivision
  - IP addresses – masking exercises
  - IPV4 *vs* IPV6
  - Basic routing concepts

  Transport layer protocols
  - Flow control
  - Establishing the connection
  - Three-way exchange of signals
  - Basic and sliding window
  - Structure of the TCP protocol
  - Structure of the UDP protocol
  - Design of client–server programmes

  Upper layer protocols
  - DNS,FTP, http, SMTP, SNMP, Telnet
  - Basic telephony concepts (FXS, FXO, E&M)
  - Basic VoIP concepts
  - Definition and structure of the ASTERIX protocol
  - Basic AMHS concepts and ITU-400 and ITU-500 protocols

- ATN functionality
- ATN components
- End systems (ATN router, subnetworks)
- ATN physical and administrative structure
- AMHS system
- AIDC system
- CPDLC application
- General functionality
- Service functionality
- CPDLC SARPs
- HFDL, VDL
- ADS application (ADS-C, ADS-B)
- General functionality
- Service functionality
- ADS SARPs
- Mode S ES, VDL 4. UAT, AMSS

Training in the navigation area

➢ <u>Course on the Global Navigation Satellite System (GNSS)</u>
Suggested curriculum

Description of GNSS systems
- Satellite-based navigation systems
- Augmentation systems
- GNSS avionics

Services supported by GNSS
- Performance characteristics
- Potential operations with GNSS augmentation systems

GNSS implementation
- Organisation and planning
- Development procedure
- Airspace considerations
- ATC considerations
- Aeronautical information services
- Certification and approval of operations
- GNSS vulnerability
- Transition plan

GNSS evolution
- GNSS requirements to support other applications
- Security aspects
- GNSS evolution
- Protection dates

Training in the surveillance area

➢ <u>Course on secondary surveillance radar systems</u>
Suggested curriculum

- System description and functional objectives
- Operating characteristics
- Mode S compatibility with Modes A/C
- Secondary surveillance system (SSR) technique
- SSR by monopulse
- Considerations concerning Mode S protocol
- Implementation of Mode S
- Interference considerations
- ATN Mode S subnetwork
- Extended squitter, system concept and application

➢ Course on multilateration
Suggested curriculum

- Multilateration applications
  - Airport surface
  - Terminal area
  - Wide area
  - Precision runway monitoring (PRM)
  - Unit altitude monitoring

- Technical operating principle of the multilateration system
- ADS-B and multilateration

➢ Course on ADS-B
Suggested curriculum

- Definition of ADS-B
- ADS-B standard
  - 1090MHZ ES 1090MHZ ES
  - UAT (Universal Access Transceiver)
  - VDL Mode 4
- ADS-B messages
- ADS-B system integrity
- ADS-B trials
- Implementation of ADS-B systems

SUGGESTED ICAO BIBLIOGRAPHY

COMMUNICATIONS
Annex 10 Volume III
DOC 9739 (Comprehensive ATN manual)
DOC 9880 (ATN OSI manual)
DOC 9896 (ATN IPS manual)
DOC 9741(Manual on HF data link)
DOC 9776 (Manual on VHF data link Mode 2)
DOC 9805 (VHF data link Mode 3)
DOC 9816 (VHF data link Mode 4)
DOC 9694 (Manual on ATS data link applications)

NAVIGATION
Annex 10 Volume I
DOC 9849 (Manual on the global navigation satellite system)

SURVEILLANCE
Annex 10 Volume IV
DOC 9684 (Manual on the secondary surveillance radar (SSR) systems)
Doc. 9688 (Manual on Mode S specific services)
Circular 311 (Assessment of ADS-B to support ATS services, and Implementation Guide)

Training on automated systems at the ACCs

The purpose of this course is to describe the main automated systems at the ACCs**.**

General curriculum

- Function of the ACC and equipment necessary for its operation**.**
- Interface between sensors and processing systems at the ACCs
  - Surveillance system interface (radar, ADS-C, ADS-B , others)
  - Messaging system interface (AFTN, AMHS, etc.)
  - Databank interface (AIS, MET, others)
  - Interface between processing systems
  - Various interfaces
- Voice circuit selection and switching (VCS) systems
- Surveillance data processing systems (operational requirements, operational alerts, etc.)
- Flight plan processing systems
- Display systems (surveillance data, flight plans, etc.)
- Audio and video recording and playback systems

Training in the aeronautical information area

- Course AIS/024 (Second Generation of CAR/SAM Course AIS/021)

  - Considers training of AIS/MAP personnel for AIS-to-AIM transition, and its role within the framework of ATM requirements

- Training on the traditional AIS-MAP service

- Course on digital aeronautical mapping, with emphasis on the use of geographic information systems (GIS) and spatial databases;

- Course on the AIS-MAP quality management system;

- Basic course on introduction and transition from AIS-MAP to AIM

Training in the aeronautical meteorology area

- Equivalence course for aeronautical meteorologists trained under the old WMO Class II

Reference:

– Guidelines for the education and training of personnel in meteorology and operational hydrology, Vol. I – Meteorology. WMO-N° 258; and
– Training and qualification requirements for aeronautical meteorological personnel. Supplement N° 1 to WMO-N° 258

- Course on ATS/AIS/MET coordination

- Course on quality management system in MET services

Training in the air traffic management area (ATM)

Airspace planning

- Course on introduction to airspace planning and design

- Course on airspace safety assessment – Collision risk model

PBN for en-route, TMA and approach

- PBN airspace concept
    - CAR/SAM PBN roadmap
    - Continuous descent operations

- Introduction to performance-based navigation (PBN)
    - For technical personnel from all air navigation services

- Aircraft approval – operations

- Aircraft approval – airworthiness

- Aircraft dispatchers

- Maintenance personnel

- Pilots

- Activities geared to operators in relation to operational and economic benefits expected from PBN implementation

Training in the PANS/OPS area

- Basic procedure design
- Basic RNAV/RNP procedure design
    a) RNAV NPA procedures based on VOR-DME; DME-DME; GNSS sensors
    b) SID/STAR/approach procedures
    c) APV/Baro-VNAV
    d) RNP AR (authorisation required)

Training in the air traffic flow management (ATFM) area

- Introduction to ATFM – CDM concept
- Calculation of airport capacity and airport acceptance rate
- Calculation of ATS capacity (work sectors)

Training in the safety management area

- Introduction to the State Safety Programme (SSP)
- Introduction to the safety management system (SMS)
- Implementation of SSP and SMS
- Development of ATS safety programmes
- ATC Threat and Error Management (TEM)

Training in the search and rescue area

- Basic SAR course: Students will be capable of identifying the parts of a SAR system, its organisation, management, operation of all its components, and the documentation affecting it directly and indirectly;
- SAR unit coordinator course: Students will be capable of coordinating the missions of the SAR unit (on the mountain, at sea, etc.);
- SAR coordinator course: Students will be capable of managing a SAR unit, and plan, manage and coordinate SAR missions;
- SAR assistant course: Students will be capable of performing the administrative functions of a SAR unit and the required operational support tasks;

- SAR management course: Students will be able to take on the responsibility of establishing and managing the provision of SAR services, and managing and coordinating the planning of said services.

Training in the aerodrome area (AGA)
Suggested items that require training:

- Specific training for high executives
- Airports /Air navigation plan
- National airport development plans
- Airport master plans
- Airport certification
- Airport safety management systems (SMS)
- Performance and performance indicators
- Electrical systems/lights/air side lighting
- Electrical power on the land side
- Markings and signs
- Apron management
- Communications /movement of vehicles on the air side
- Cargo management
- Airport infrastructure maintenance
- Emergency plans/COE
- Adjustment of airport infrastructure
- Environment and fauna management
- Airport demand/capacity
- Aircraft/pavement interaction (roughness and friction)

Training in the area of language proficiency
Courses/seminars/workshops dealing with matters related to this area must be aimed at ensuring that air traffic control personnel, aeronautial station operators and flight crews engaged in flight operations in airspace requiring the use of the English language have the proficiency required to carry out and understand radiotelephone communications in said language.

APPENDIX E

GUIDELINES FOR THE PREPARATION OF A GNSS TRAINING PROGRAMME

1. INTRODUCTION

1.1 The purpose of this document is to establish a training guide on the management and operation of GNSS systems in general, and on SBAS/GBAS in particular. The work and conclusions of the SACCSA Phase II and the experience of the early implementation of the GBAS prototype stations in the Regions were drawn upon in preparing this document. Accordingly, the following items have been established:

- To identify human resource requirements resulting from the implementation of GNSS systems in the CAR/SAM Regions.
- To determine the initial personnel qualification and training level needed in each of the elements in the SBAS/GBAS system.
- To establish a training programme, taking into account the existing training capacity in the region and the training requirements identified.

1.2 This document covers all of the objectives proposed, defining the training requirements for maintenance, supervision, and engineering personnel working in the GNSS system.

1.3 The training design process will consist of four basic phases:

Phase 1: Formulation of the mission and objective of GNSS systems.

Phase 2: Description of functions, which consists of:

a) Identification of key tasks and activities of the system personnel.
b) Grouping of tasks and activities in each function, thus establishing the positions required for the fulfilment of these tasks and activities.
c) Grouping of positions in units and, grouping of units in bigger clusters, i.e. defining the functional structure of the system.

Phase 3: Baseline analysis, or, in other words, training levels to be initially held by technical personnel of the future GNSS augmentation service provider.

Phase 4: Lastly, design of the training activity, based on the functional structure of the SBAS/GBAS system, particularly focusing on:

a) Tasks to be performed by the individual responsible for a specific position and degree of specialisation required,
b) Skills and knowledge required to perform the aforementioned tasks,
c) etc.

1.4 This document proposes a training plan to train the technical personnel on the optimum operation of the systems and tools that make up SBAS/GBAS systems in order to optimise their operation.

2. DISCUSSION

2.1 DESCRIPTION OF PROCESSES (FUNCTIONS)

2.1.1 GNSS (SBAS/GBAS) systems consist of the following segments:

- **Space Segment:** consists of the global coverage L-band navigation payload of GEO satellites (for SBAS), and will consist of the satellite constellation, providing distance data to aircraft receivers and the GBAS ground station.
- **Ground Segment:** which will control the SBAS and GBAS mission and will provide GPS satellite augmentation information.
- **User Segment:** which will consist of "SBAS standard" receivers or GBAS monitors to be used to verify signal-in-space services.
- **Support Segment:** which will consist of the platforms for the Validation and Qualification of system services.

2.1.2 Training requirements for the operation of the different system elements are mainly focused on the ground and support segments.

2.1.3 Ground Segment: is made up of the following elements:

- Reference Stations.
- Process and Control Centres, which contain:
  - A central processing unit.
  - A central control unit.
- Satellite Access Stations (SBAS).
- Ground Communications Network.

2.1.4 Support Segment: is made up of the following subsystems:

- User-level service analysis subsystem.
- Service analysis subsystem.
- End-to-end and service volume simulation subsystem.
- Filing and data access subsystem.

2.1.5 Each of these elements will require technical and maintenance personnel duly trained to perform a series of activities.

2.2 IDENTIFYING TASKS AND ACTIVITIES OF GROUND SEGMENT PERSONNEL

2.2.1 Among other activities this personnel may be called upon to perform are the following:

- Operation of equipment and systems of ground segment stations.
- Maintenance of ground segment equipment.
- Operation of communications between system stations / units.

2.2.2 In addition to these activities, coordination, planning, and management tasks will need to be performed, and this will require a specific position of responsibility.

2.3 IDENTIFYING TASKS AND ACTIVITIES OF SUPPORT SEGMENT PERSONNEL

2.3.1 In this case, the following tasks and activities could be considered:

- Training, operational validation, and certification, as necessary, on specific user and system applications.
- Development, maintenance and/or implementation of simulation tools.
- Tasks related to system data filing and analysis.
- Support to the operation and maintenance functions of the ground segment, and, above all, to system engineering and development functions.
- Tasks related to the interoperability between system elements.

2.4 MISSION OF WORK POSITIONS

2.4.1 Once the context of the activities involved in GNSS augmentation systems has been established, it will be advisable to determine the structure of the work positions to ensure an optimum performance of the corresponding tasks.

2.4.2 Next, and in very broad terms, is a description of the mission of each work position.

2.4.2.1 System Manager

The System Manager will be ultimately responsible for everything done by system personnel. His/her mission is to direct, coordinate, supervise, and establish performance guidelines for the efficient completion of system activities, in accordance with the development plans and the policies established by the service provider.

2.4.2.2 Ground Segment Manager

He/she is responsible for the operation of the GNSS system and his/her mission is to plan, control, and standardise CPCS, SAS, and ERS operation.

He/she may have personnel to assist in his/her tasks, thus creating "ground segment technical divisions".

2.4.2.3 Local System Manager

The mission of the Local System Manager is to direct, coordinate, supervise, and establish performance guidelines for the activities of the local system under his/her responsibility, in accordance with the development plans and policies established by the GNSS augmentation service provider. He/she is ultimately responsible for achieving the objectives at the local level, as well as for implementing procedures and other directives issued by the different central units (support segment, quality and safety; and ground segment).

- **Maintenance personnel** → His/her mission is to perform maintenance on the systems installed. This maintenance will be level 0 (equipment reboot, power supply, acclimatisation and level 1 (replacing boards or components identified as defective). Since there is more than one local manager, they will be responsible for the corresponding maintenance area. An assessment will be made of the need to create a maintenance area for the support segment, or perhaps one of the areas located in one of the CPCS can support the support segment engineering area in performing maintenance tasks (based on future decisions as to the physical location of process and control centres).
- **Supervision personnel** → The system control and monitoring (the main functions of the UCC) teams will operate the system on 24H shifts.
- **Engineering personnel** → The mission of the engineering personnel will be, on one hand, the general coordination of maintenance (perform level 2 maintenance of ERS, and support level 0 and 1 maintenance) and operations; and, on the other hand, support the local unit (CPCS n manager).

2.4.2.4 **Support Segment Manager**

His/her mission is to plan, coordinate, and manage the operation of the support segment elements in accordance with the commitments undertaken.

- **Data analysis personnel** → The mission of analysts is to operate all the tools (simulators and other analytical tools) built in the different support segment subsystems (see item 3, Description of Processes (functions) and conduct a first analysis of results and conclusions.
- **Engineering personnel** → The mission of engineering personnel will be to create study scenarios, analyse results obtained, propose modifications and arrive at conclusions related to the areas of action of the support segment. They could also participate in the maintenance of the equipment of the support segment subsystems, since the equipment consist of HW and SW. This area is also responsible for the detailed analysis of the results obtained by the analysis area and generating the action derived from it.

2.4.2.5 **Safety and Quality System Manager**

He/she will be responsible for developing/implementing the Quality and Safety System, in accordance with quality/safety certifications required of the GNSS augmentation service provider, and for coordinating and being accountable for seeing through the objectives established in the quality and safety policies of the service provider.

2.5 **WORK POSITION PROFILES**

2.5.1 Once the functional structure has been defined, and the mission of the person responsible or the personnel in each of the proposed areas is known, it is possible to understand the scope of action of each of the aforementioned work positions and, therefore, to determine the minimum and/or desirable requirements in terms of training, knowledge, and experience for each of the work positions, as reflected in the following tables:

		GES[1]	ING[2]	OPS[3]
	TOPICS	NR[4]	NR	NR
Specific Training				
Legend: 0: No specific training required 1: Basic level required 2: Advanced level required 3: Expert level required	Air Nav. & ATC	2	2	1
	Propagation of electromagnetic waves	1	2	0
	Electrical facilities	1	2	2
	Radar and aids	1	1	0
	Satellite navigation	2	2	1
	Augmentation programmes	2	2	1
	Quality systems	2	0	0
	Safety management systems	2	0	0
	Auditing	2	0	0
	GNSS	0	2	0
	Prevention of labour risks	0	0	1
	Environment	0	0	0
	ATC systems and operations	0	1	2
Prior Technical Experience				
Legend: 0: No specific experience required 1: 1-3 years 2: 3-5 years 3: More than 5 years	In the GNSS field	1	2	1
	In Air. Nav. or ATC	2	0	0
	Level of knowledge of augmentation programmes *	1	0	0
	Quality systems	1	0	0
	Safety systems (implementation and management)	1	1	0
	Experience in performing audits *	1	0	0
	Control and monitoring of operations in the satellite control centres	0	2	0
	Control and monitoring of operations in network infrastructure	0	2	0
	Control and monitoring of operations in fixed and mobile communications	0	2	0
	Control and monitoring of operations in other fields	0	1	0
	Maintenance (preventive and corrective) in the aeronautical field	0	1	2
	Operation of critical systems	0	1	2
	Use of identification, analysis, and retrieval equipment	0	2	2
	Definition/design of technical procedures	0	2	0
	Definition and drafting of technical manuals	0	2	0
	Data processing, analyses, drawing of conclusions and def. of work plans	0	2	0

[1] GES: Management personnel
[2] ING: Engineering personnel
[3] OPS: Operations/ maintenance personnel
[4] NR: Minimum recommended level

* Apply the legend on the degree of knowledge (From 0:None to 3:Expert)

	Tasks related to the operation and supervision of aeronautical systems and equipment	0	0	2
Prior managerial experience				
Legend: 0: No specific experience required 1: 1-3 years 2: 3-5 years 3: More than 5 years	Equipment management	3	1	0
	Budget management	3	0	0
	Infrastructure management	3	0	0
	Negotiation	3	1	0
	Planning	3	1	0
	National and international coordination	2	1	0
	Technical project management	2	0	0
	Process reengineering	1	0	0
Office software				
Legend: 1: User 2: Advanced	MS Word	1	1	1
	MS Excel	2	1	1
	MS Access	1	1	1
	MS Power Point	1	1	1
	MS Project	2	1	1
	Internet and e-mail	2	1	1
	Database managers	1	2	1
Languages				
Legend: ICAO Level: 2, 3, 4 ó 5	Level of English (ICAO)	4	3	2

Table A1: Requirements for candidates to work positions generated in SBAS/GBAS systems

Position	Candidate requirements	Level[5]
SBAS/GBAS system manager	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Satellite navigation	N
	▪ Electromagnetic wave propagation	D
	▪ Electrical facilities	N
	▪ Radar and aids	D
	▪ GNSS	D
	▪ Augmentation programmes	D
	At least 3 years of managerial experience in similar units.	N
	Quality system management experience.	D
	Safety management experience.	N
	At least 3 years of experience in the GNSS field.	D
	Knowledge of office software, database managers, and planning tools.	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N

[5] D: Desirable
N: Required in order to perform the job with sufficient guarantee

Safety and quality system manager	Degree in airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	D
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ GNSS	D
	▪ Augmentation programmes	D
	Experience in quality system management	N
	Experience in safety management	N
	At least 3 years of experience in the GNSS field	D
	Knowledge of Office software package	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N
Ground segment manager	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	N
	▪ Radar and aids	N
	▪ GNSS	N
	▪ Augmentation programmes	N
	Experience in the operation of critical systems	N
	At least 3 years of experience in the GNSS field	D
	Knowledge of the Office package and database management tools	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N
Support segment manager	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	D
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ GNSS	N
	▪ Augmentation programmes	N
	Experience in safety management	D
	At least 3 years of experience in the GNSS field	D
	Knowledge of Office software and database management tools.	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N
Local system manager	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Satellite navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	N
	▪ Radar and aids	N
	▪ GNSS	N
	▪ Augmentation programmes	N
	At least 3 years of managerial experience in units of similar size	N
	Experience in quality system management	D

	Experience in safety management	D
	At least 3 years of experience in the GNSS field	D
	Knowledge of office software, database managers, and planning tools	N
	High level of English, both spoken and written. ICAO (operational) level 4 required.	N
Data analysis team	Intermediate degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	D
	▪ Significant knowledge of operational aid tools	N
	Security Management experience.	D
	At least 3 years of experience in the field of GNSS.	D
	Knowledge of Office software, as well as database management tools	N
	High level of English, both spoken and written. ICAO level 3 required.	N
Support segment engineering team	Degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	N
	Experience in safety management	D
	At least 3 years of experience in the GNSS field	N
	Knowledge of Office software, as well as database management tools	N
	High level of English, both spoken and written. ICAO level 3 required.	N
Maintenance team	Intermediate degree as maintenance technician, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	D
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	N
	Knowledge of Office software, as well as database management tools	N
	High level of English, both spoken and written. ICAO level 3 required.	N
Supervision team	Intermediate degree in telecommunications or airspace engineering, or equivalent, with specific training in:	N
	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	N
	Knowledge of Office software, as well as database management tools	N
	Intermediate level of English, both spoken and written. ICAO level 2 required.	N
Ground segment engineering team	Degree in telecommunications or airspace engineering, or any other like degree, with specific training in:	N

	▪ Air navigation	N
	▪ Electromagnetic wave propagation	N
	▪ Electrical facilities	D
	▪ Radar and aids	D
	▪ Satellite navigation	N
	Experience in safety management	D
	At least 3 years of experience in the GNSS field	N
	Knowledge of Office software, as well as database management tools	N
	High level of English, both spoken and written. ICAO level 3 required.	N

Table A2: Requirements for candidates to work positions generated by SBAS/GBAS systems

2.6 REQUIRED TRAINING CYCLE

2.6.1 The last phase of the process is the description of the training cycle, understood as a series of training activities to be carried out by individuals who, from the three groups analysed, would be the most appropriate candidates for the job positions previously described.

	Job Position[6]									
Training activity	**G1**	**G2**	**G3**	**G4**	**GL**	**I1**	**I2**	**O1**	**O2**	**O3**
Course on satellite navigation and augmentation programmes	2	2	2	2	2	2	2	1	1	1
Course on the SBAS/GBAS system	2	2	2	2	2	2	2	1	1	1
Satellite communications	1	1	1	1	1	2	2	1	1	1
Operation and maintenance of SBAS/GBAS reference stations	0	0	0	0	0	2	2	2	2	2
Operation and maintenance of satellite access stations (SAS) (SBAS)	0	0	0	0	0	2	2	2	2	2
Operation and maintenance of SBAS/GBAS process and control centres	0	0	0	0	0	2	2	2	2	2
On-the-job safety and health	1	1	1	1	1	1	1	2	2	2
Competency-based management system	2	2	2	2	2	1	1	0	0	0
Course on measuring instruments	0	0	0	0	0	0	0	2	2	2
Course on quality systems	2	2	2	2	2	1	1	0	0	0
Course on safety management	2	2	2	2	2	1	1	0	0	0
2 Advanced Level 1 Basic Level	0	N/A								

Table A3: Training activities proposed for the different groups

[6] G1 → SBAS/GBAS System Manager
G2 → Support Segment Manager
G3 → Ground Segment Manager
G4 → Quality and Safety System Manager
GL → Local Manager
I1 → Support Segment Engineering Personnel
I2 → Ground Segment Engineering Personnel
O1 → Data Analysis Personnel
O2 → Supervision Personnel
O3 → Maintenance Personnel

2.6.2 The following possible modalities are proposed for these training activities:

- **On-line or CBT Courses:** These CBTs will be classified according to their duration:
- **In-person P Courses**: These classroom courses can be delivered either in the conventional form, with a teacher and the students in a classroom, or the teacher conducting the course for the students through satellite communication.

2.6.3 Taking into account these modalities, it is proposed that the aforementioned activities be carried out as described in the following tables.

2.6.4 The tables have been divided by training activity, defining the need to carry out the activity in one, two, or three courses (C1, C2 or C3), with different scopes. These courses can be taught on-line, in-person, or a combination of both.

2.6.5 Likewise, different levels of detail have been determined for each course: basic and advanced.

2.6.6 Furthermore, a recurrent element has been identified (at least once a year) to ensure an appropriate level of knowledge throughout the life of the SBAS/GBAS system.

Course on Satellite Navigation and Augmentation Programmes						
Course	C 1		C 2		C 3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	CBT	CBT	NA	NA
In-person	P	P	P	P	NA	NA
Recurrent	CBT	CBT	CBT	CBT	NA	NA

Table B1: Course on Satellite Navigation and Augmentation Programmes

Course on the SBAS/GBAS System						
Course	C 1		C 2		C 3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	NA	NA	NA	NA
In-person	P	P	NA	NA	NA	NA
Recurrent	CBT	CBT	NA	NA	NA	NA

Table B2: Course on the SBAS/GBAS System

Satellite Communications						
Course	C 1		C 2		C 3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	NA	NA	NA	NA
In-person	P	P	NA	NA	NA	NA
Recurrent	CBT	CBT	NA	NA	NA	NA

Table B3: Satellite Communications

Operation and Maintenance of SBAS/GBAS Reference Stations						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	CBT	NA	CBT	NA	NA
In-person	NA	P	NA	P	NA	NA
Recurrent	NA	CBT	NA	CBT	NA	NA

Table B4: Operation and Maintenance of SBAS/GBAS Reference Stations

Operation and Maintenance of Satellite Access Stations (SAS)						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	CBT	NA	CBT	NA	NA
In-person	NA	P	NA	P	NA	NA
Recurrent	NA	CBT	NA	CBT	NA	NA

Table B5: Operation and Maintenance of Satellite Access Stations (SAS)

Operation and Maintenance of SBAS/GBAS Process and Control Centres						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	CBT	NA	CBT	NA	CBT
In-person	NA	P	NA	P	NA	P
Recurrent	NA	CBT	NA	CBT	NA	CBT

Table B6: Operation and Maintenance of SBAS/GBAS Process and Control Centres

On-the-job safety and health						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	NA	NA	NA	NA
In-person	NA	NA	NA	NA	NA	NA
Recurrent	CBT	CBT	NA	NA	NA	NA

Table B7: On-the-job safety and health

Competency-based management system						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	NA	NA	NA	NA	NA
In-person	P	P	NA	NA	NA	NA
Recurrent	NA	NA	NA	NA	NA	NA

Table B8: Competency-based management system

Course on measuring instruments						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	NA	NA	NA	NA	NA
In-person	NA	P	NA	NA	NA	NA
Recurrent	NA	NA	NA	NA	NA	NA

Table B9: Course on Measuring Instruments

Course on quality systems						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	NA	NA	NA	NA	NA	NA
In-person	P	P	P	P	NA	NA
Recurrent	P	P	P	P	NA	NA

Table B10: Course on Quality Systems

Course on safety management						
Course	C 1		C 2		C3	
Level	Basic	Advanced	Basic	Advanced	Basic	Advanced
CBT	CBT	CBT	CBT	CBT	NA	NA
In-person	P	P	P	P	NA	NA
Recurrent	P	P	P	P	NA	NA

Table B11: Course on Safety Management