



**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**REPORT OF THE EIGHTEENTH MEETING OF  
THE CAR/SAM REGIONAL PLANNING AND  
IMPLEMENTATION GROUP  
(GREPECAS/18)**

(Punta Cana, Dominican Republic, 9 – 14 April 2018)

**FINAL REPORT**



The designations and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of ICAO concerning the legal status of any country, territory, city or area, or its authorities, or concerning the delimitation of its frontiers or boundaries.



**TABLE OF CONTENTS**

i	Table of Contents .....	i-1
ii	History of the Meeting .....	ii-1
	Place and Duration of the Meeting.....	ii-1
	Opening Ceremony and Other Matters .....	ii-1
	Organisation, Officers and Secretariat .....	ii-2
	Working Languages .....	ii-3
	Agenda .....	ii-3
	Attendance.....	ii-4
	Conclusions and Decisions.....	ii-4
	List of Conclusions .....	ii-5
	List of Decisions .....	ii-6
iii	List of Participants .....	iii-1
iv	List of Documentation.....	iv-1
	Report on Agenda Item 1 .....	1-1
	Report on Agenda Item 2 .....	2-1
	Report on Agenda Item 3 .....	3-1
	Report on Agenda Item 4 .....	4-1
	Report on Agenda Item 5 .....	5-1
	Report on Agenda Item 6 .....	6-1
	Report on Agenda Item 7 .....	7-1



## HISTORY OF THE MEETING

### ii.1 Place and Duration of the Meeting

ii.1.1 The Eighteenth Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/18) was held in Punta Cana, Dominican Republic, from 9 to 14 April 2018, at the “Grand Palladium Punta Cana Resort & Spa”.

### ii.2 Opening Ceremony and Other Matters

ii.2.1 The head table was composed by:

- Dr. Alejandro Herrera, Director General of the *Instituto Dominicano de Aviación Civil*
- Lt. Gen. Rubén Paulino Sem, Minister of Defense of Dominican Republic
- Mr. Pablo Lister, Secretary of the Civil Aviation Board of Dominican Republic
- Mr. Jacques Boursiquot, Chairman of GREPECAS
- Mr. Stephen Creamer, Director, Air Navigation Bureau, ICAO
- Mr. Melvin Cintron, Regional Director of the ICAO North American, Central American and Caribbean (NACC) Regional Office
- Mr. Fabio Rabbani, Regional Director of the ICAO South American (SAM) Regional Office, and Secretary of GREPECAS

ii.2.2 The Meeting acknowledged the presence of the representatives of Cuba, the United Arab Emirates and the Dominican Republic on the ICAO Council.

ii.2.3 Mr. Melvin Cintron, Regional Director of the ICAO NACC Regional Office, highlighted that aviation continued to be the safest means of collective transportation, although still vulnerable despite technological developments in aviation. He noted that GREPECAS mechanisms had been of great value to the CAR/SAM Regions, the results being reflected in air navigation improvements, increased safety levels, and environmental benefits in these Regions.

ii.2.4 Mr. Stephen Creamer, Director, Air Navigation Bureau, ICAO Headquarters, referred to challenges related to the Global Aviation Safety Plan (GASP) the Global Air Navigation Plan (GANP), and increased aviation activity worldwide. Regarding GANP-related priorities, he underlined that new technologies would help address the new challenges concerning air traffic management. Furthermore, new strategies were required to face emerging threats to international aviation (cybersecurity, drones, etc.). He emphasised the training of new aviation professionals in the management and use of the new technologies that would be applied in aviation in the years to come.

ii.2.5 Mr. Fabio Rabbani, Regional Director of the ICAO South American (SAM) Regional Office, and Secretary of GREPECAS, on behalf of the Secretary General, expressed his sincere acknowledgment to the authorities of the Dominican Republic for hosting the GREPECAS/18 Meeting. Mr. Rabbani also highlighted the consolidation of the project-based implementation approach, with metrics that provided tangible results in the areas involved in air navigation services. He also noted that new challenges and threats to safe development of aviation were emerging, which had to be faced in a proactive and collaborative manner. Finally, he reassured his commitment to joint work between the two Offices, especially at this point when the responsibilities of the GREPECAS and RASG-PA Secretariats were being transferred.

ii.2.6 The Director General of the *Instituto Dominicano de Aviación Civil*, Mr. Alejandro Herrera, as host of the Meeting, stated that the Dominican Republic would always be honoured to receive and host aviation professionals. He highlighted that global statistics showed an extraordinary and constant increase in the volume of air operations and in the number of airline passengers, and that statistical data for the Dominican Republic also showed a constant increase, reason why State authorities spared no efforts or resources to maintain the momentum and modernisation of Dominican civil aviation. Dr. Herrera officially opened the Meeting.

ii.2.7 Moreover, the Meeting thanked the collaboration of the following sponsors: Aeronav, AIREON, Airport Team Solutions, ASCA, CANSO, IACIT, JAC, Magycorp S.A., Metron Aviation, Thales and Servair, for their presentations related with the activities in the field of the air navigation systems, as well as the exhibition of their products to participants.

### ii.3 **Organisation, Officers and Secretariat**

ii.3.1 Mr. Jacques Boursiquot (Haiti), Chairman of GREPECAS, chaired the Meeting. Mr. Fabio Rabbani, Regional Director, ICAO South American Regional Office, acted as Secretary of the Meeting with the assistance of the following officers from the ICAO NACC and SAM Regional Offices:

Melvin Cintron	Regional Director, ICAO NACC Regional Office
Oscar Quesada	Deputy Regional Director, ICAO SAM Regional Office
Erwin Lassoij	Chief Programmes Coordination and Implementation (PCI) Section, ICAO Headquarters
Julio Siu	Deputy Regional Director, ICAO NACC Regional Office
Jaime Calderon	Regional Officer, Aerodromes and Ground Aids, ICAO NACC Regional Office
Raul Martinez	Regional Officer, Aeronautical Information Management, ICAO NACC Regional Office
Jorge Armoa	Regional Officer, Aeronautical Information Management and Aeronautical Meteorology, ICAO SAM Regional Office

Luis Sánchez	Regional Office, Aeronautical Meteorology and Environment, ICAO NACC, Regional Office
Fabio Salvatierra	Regional Officer, Aerodromes and Ground Aids, ICAO SAM Regional Office
Fernando Hermoza	Regional Officer, Air Traffic Management and Search and Rescue, ICAO SAM Regional Office
Mayda Ávila	Regional Officer, Communications, Navigation and Surveillance, ICAO NACC Regional Office
Eddian Méndez	Regional Officer, Air Traffic Management and Search and Rescue, ICAO NACC Regional Office
Roberto Sosa	Regional Officer, Air Navigation Services and Safety, ICAO SAM Regional Office

#### ii.4 **Working Languages**

ii.4.1 The working languages of the Meeting and meeting documents were English and Spanish.

#### ii.5 **Agenda**

ii.5.1 The following agenda was adopted:

**Agenda Item 1: Follow-up on the results of the PPRC/3 and PPRC/4 meetings and analysis of GREPECAS valid conclusions**

- 1.1 Follow-up on the results of the PPRC/3 and PPRC/4 meetings
- 1.2 Review of action taken regarding GREPECAS valid conclusions

**Agenda Item 2: Review of coordination activities between GREPECAS and RASG-PA**

- 2.1 Regional activities of RASG-PA
- 2.2 Coordination activities between GREPECAS and RASG-PA

**Agenda Item 3: Air navigation activities at global, inter-regional and intra-regional level**

- 3.1 Results of the ICAO Assembly – 39th Session
- 3.2 Follow-up on the implementation of global, inter-regional and intra-regional activities

**Agenda Item 4: Regional air navigation planning and implementation performance framework: Review of programmes and projects**

- 4.1 Projects under the PBN Programme (B0-APTA, B0-FRTO, B0-CDO and B0-CCO)
- 4.2 Projects under the ATFM Programme (B0-SEQ, B0-FRTO, B0-NOPS and B0 ACDM)
- 4.3 Projects under the Automation and ATM Situational Awareness Programme (B0-RSEQ, B0-FICE, B0-SNET, B0-ASUR and B0-SURF)
- 4.4 Projects under the Ground-ground and Air-ground Telecommunication Infrastructure Programme (B0-FICE and B0-TBO)
- 4.5 Projects under the Aerodromes Programme (B0-SURF and B0-ACDM);
- 4.6 Projects under the AIM Programme (B0-DATM)
- 4.7 Projects under the Aeronautical Meteorology Programme (B0-AMET)
- 4.8 Progress made in, and achievement of, the air navigation goals of the Declarations of Bogota and Port-of-Spain, and assessment of activities for the implementation of ASBU B1

**Agenda Item 5: Follow-up on the resolution of air navigation deficiencies in the CAR/SAM Regions**

**Agenda Item 6: Matters related to the organisation of GREPECAS**

**Agenda Item 7: Other business**

**ii.6 Attendance**

ii.6.1 The GREPECAS/18 Meeting was attended by 86 participants from 18 States/Territories of the CAR/SAM Regions, the representative of the United Arab Emirates before the ICAO Council, observers from 5 International Organisations, and representatives of 10 companies of the industry. The list of participants appears on page iii-1.

**ii.7 Conclusions and Decisions**

ii.7.1 GREPECAS records its action in the form of conclusions and decisions as follows:

**Conclusions** deal with matters that, in accordance with the terms of reference of the Group, require the direct attention of States/Territories and/or International Organisations, or further action as proposed by the Secretary in accordance with the established procedures.

**Decisions** refer to matters dealing exclusively with the internal organisation of the Group and its contributory bodies.

ii.8 **List of Conclusions<sup>1</sup>**

<b>No.</b>	<b>Title</b>	<b>Page</b>
18/1	ACTIONS FOR ATFM IMPLEMENTATION IN THE CAR REGION	WP/03 1B-1
18/2	ESTABLISHMENT OF A WORKING GROUP TO OBTAIN BETTER AMHS OPERATIONAL USE	WP/03 1B-1
18/3	REVISION OF THE MET PROGRAMME AND ITS TASKS	WP/03 1B-1
18/4	DEVELOPMENT OF AIR NAVIGATION PLANS ALIGNED WITH THE GANP AND THE REGIONAL PERFORMANCE-BASED AIR NAVIGATION PLANS	WP/03 1B-1
18/5	IMPROVED DATA COLLECTION PROCESS FOR THE TREATMENT OF DEFICIENCIES REPORTED BY IFALPA AND IATA	WP/03 1B-2
18/6	RESOLUTION OF AERONAUTICAL METEOROLOGY DEFICIENCIES	WP/03 1B-2
18/7	POSTPONEMENT OF THE APPROVAL OF VOL. III OF CAR/SAM EANP	WP/03 1B-2
18/8	GREATER SUPPORT FROM STATES TO AGA ISSUES AND PROJECTS	WP/03 1B-2
18/10	FOLLOW-UP TO THE IMPLEMENTATION OF A39 RESOLUTIONS RELATED TO AIR NAVIGATION	3-1
18/13	SAFETY MANAGEMENT IMPLEMENTATION	3-6
18/14	ENHANCEMENT OF SOUTH ATLANTIC (SAT) GROUP STRUCTURE	3-7
18/15	INTERFACE CONTROL DOCUMENTS FOR AIDC IMPLEMENTATION	4-6
18/16	SHORT-TERM IMPLEMENTATION BY THE STATES OF AIDC FUNCTIONALITY	4-7
18/17	MEASURES TO REDUCE FLIGHT PLAN ERRORS	4-7
18/19	AERODROME CERTIFICATION PLAN	4-10
18/20	MODIFICATION OF THE GREPECAS PROCEDURAL HANDBOOK	6-2
18/21	SUPPORT TO GTE AND CARSAMMA ACTIVITIES TO IMPROVE THE ANALYSIS OF INFORMATION ON DEVIATIONS IN RVSM AIRSPACE	7-1
18/22	APPROVAL OF THE AMENDMENT TO CARSAMMA TERMS OF REFERENCE AND OF THE GUIDANCE MANUAL FOR POINTS OF CONTACT (POC)	7-3

<sup>1</sup> Conclusions are presented in the format requested by the Air Navigation Commission (ANC) through Working Paper 8993 (6/11/2015) progress made by the Ad hoc Working Group on PIRG and RASG reports (item No. 20036).

ii.9 **List of Decisions<sup>2</sup>**

<b>No.</b>	<b>Title</b>	<b>Page</b>
18/9	AD HOC GROUP TO ANALYSE GREPECAS - RASG-PA COORDINATION IMPROVEMENTS	2-2
18/11	CHARTING DEFICIENCY STRATEGY	3-5
18/12	RNAV TO RNP CHARTING TRANSITION	3-5
18/18	MERGING OF PROJECTS F1 AND F2 INTO A NEW PROJECT F1	4-10

---

<sup>2</sup> Decisions are presented in the format requested by the Air Navigation Commission (ANC) through Working Paper 8993 (6/11/2015) progress made by the Ad hoc Working Group on PIRG and RASG reports (item No. 20036).

**iii. List of Participants****BOLIVIA**

1. Reynaldo Cusi Mita

**BRAZIL / BRASIL**

2. Ary Rodrigues Bertolino
3. Luiz Roberto Barbosa Medeiros
4. Dalmo José Braga Paim
5. Chrystian Alex Scherk Ciccacio

**CHILE**

6. Germán A. Olave
7. Alfonso E. de la Vega

**COSTA RICA**

8. Carlos Bolaños Mayorga

**CUBA**

9. Mirta Crespo Frasier
10. Orlando Nevot González
11. Norberto Cabrera Alonso

**CURACAO / CURAZAO**

12. Jacques Lasten
13. Rivelinho Evertsz

**DOMINICAN REPUBLIC / REPÚBLICA  
DOMINICANA**

14. Carlos Veras Rosario
15. Santiago Rosa Martínez
16. Francisco Bolívar León Paulino
17. Johann Estrada Pelletier
18. Betty Castaing
19. Juan César Thomas Burgos
20. Carlos Ramón Alcántara Sánchez
21. Julio César Mejía Alcántara
22. Danis González
23. Gerson Rubén Mena
24. Juan Ramón Cabrera
25. Fredy Antonio Ruiz
26. Félix Alejandro Rosa Martínez
27. Julio Cesar Rodríguez Alcántara
28. Kelvin M. Abreu Ortiz

29. Aris de León
30. Julio Alexis Lewis
31. Antony Pérez Martínez
32. Fernando A. Casso Rodríguez
33. Brenda A. Núñez Ureña
34. Ninoska Elizabeth Rodríguez Reynoso
35. Alexi Manuel Batista Ruiz
36. Roosevelt Peña
37. Nathali Herasme Mendez
38. Vanessa Byas Lizardo
39. Rudys Arias

**ECUADOR**

40. Diego Jaramillo
41. Jorge Zurita

**EL SALVADOR**

42. Jorge Alberto Puquirre

**HAITI / HAITÍ**

43. Joseph Jacques Boursiquot
44. Philippe Lubin
45. Fred Brisson
46. Cesar Yves Andre

**NICARAGUA**

47. Eleane José Salguera Montes

**PANAMA / PANAMÁ**

48. Flor Eneida Silvera
49. Ivette M. Iturrado

**PARAGUAY**

50. Roque Díaz Estigarribia
51. María Inés Zaballa Balbiani
52. Tomás Yentzch Irala

**TRINIDAD AND TOBAGO / TRINIDAD Y TABAGO**

- 53. Kent Rammarance Singh
- 54. Andrew Ramkissoon

**UNITED ARAB EMIRATES / EMIRATOS ÁRABES UNIDOS**

- 55. Aysha Alhameli

**UNITED STATES / ESTADOS UNIDOS**

- 56. Krista Berquist
- 57. Leandro (Paul) Friedman
- 58. Thomas Naskoviak

**URUGUAY**

- 59. Pedro Cardeillac

**VENEZUELA**

- 60. Carlos Millán
- 61. Daniela Caraballo
- 62. Reidy José Zambrano Méndez

**INTERNATIONAL ORGANIZATIONS / ORGANIZACIONES INTERNACIONALES****ALTA**

- 63. Luis Felipe de Oliveira

**CANSO**

- 64. Javier Vanegas
- 65. Franklin Hoyer

**COCESNA**

- 66. Juan Carlos Trabanino Aguirre
- 67. Pablo Alexander Luna

**IATA**

- 68. Julio Cesar de Souza Pereira

**IFALPA**

- 69. Diana Martinez

**INDUSTRY/INDUSTRIA****AERONAV**

- 70. Sachin Misra

**AIREON**

- 71. Ana Maria Persiani
- 72. Francisco Almeida Da Silva

**AIRPORT TEAM SOLUTION**

- 73. Rafael Reyes
- 74. Emilio Monshantos
- 75. Luis Ariel Rosario Cabrera

**ATECH**

- 76. Carlos Eduardo Elias Ribeiro

**IACIT**

- 77. Joao Paulo Maia Ishida
- 78. Luiz Antonio Freitas de Castro

**IDS**

- 79. Brendan Kemke

**MAGYCORP S.A.**

- 80. Arturo José Balaguer Coste

**Metron Aviation**

- 81. Chris Jordon
- 82. Kapri Kupper

**ROCKWELL COLLINS**

- 83. Manny Gongora
- 84. Ronald McGowan

**THALES**

- 85. Ludmilla Gonzales
- 86. Olivier Coquet

**ICAO / OACI**

87. Stephen Creamer
88. Melvin Cintron
89. Fabio Rahnemay Rabbani
90. Oscar Quesada
91. Erwin Lassooij MSc
92. Julio Siu
93. Jaime Calderón
94. Raúl Martínez
95. Jorge Armoa
96. Luis Sánchez
97. Fabio Salvatierra
98. Fernando Hermoza
99. Mayda Ávila
100. Eddian Méndez
101. Roberto Sosa



iv **List of Documentation**

iv.1 All meeting documentation is available at the following web link:

<http://www.icao.int/GREPECAS>**WORKING PAPERS**

Number	Agenda Item	Title	Prepared and presented by
WP/01	--	Organization of the Meeting (Revised)	Secretariat
WP/02	1.1	Follow-up on the results of the PPRC/3 and PPRC/4 meetings	Secretariat
WP/03	1.2	Status of implementation of GREPECAS valid conclusions and decisions	Secretariat
WP/04	2.1	RASG-PA activity updates and deliverables	Secretariat
WP/05	2.2	GREPECAS and RASG-PA Coordination Activities	Secretariat
WP/06	3.1	Results of the 39th Session of the ICAO Assembly (A39) in relation to air navigation aspects and their impact on regional planning and implementation	Secretariat
WP/07	3.2	CAR/SAM inter-regional activities	Secretariat
WP/08	4.1	Follow-up ON PBN Programme Project Activities	Secretariat
WP/09	4.2	Follow-up on project activities under the ATFM Programme	Secretariat
WP/10	4.3	Follow-up on project activities under the Automation and ATM Situational Awareness Programme	Secretariat
WP/11	4.4	Follow-up on the implementation of project activities under the Ground-ground and ground-air telecommunication infrastructure programme for the CAR/SAM Regions	Secretariat
WP/12	4.5	Follow-Up ON Aerodrome Project Activities	Secretariat
WP/13	4.6	Review of projects under the AIM Programme (B0-DATM)	Secretariat
WP/14	4.7	Regional air navigation planning and implementation performance framework: Review of programmes and projects	Secretariat
WP/15	4.8	Progress made in, and achievement of, air navigation goals of the Declarations of Bogota and Port-of-Spain, and assessment of activities for the implementation of ASBU B1	Secretariat
WP/16	5	“A”, “B” and “U” Deficiencies in the CAR/SAM Regions	Secretariat
WP/17	6	Review of the GREPECAS terms of reference and work programme	Secretariat
WP/18	7	Election of the new GREPECAS Chairperson and Vice-Chairperson	Secretariat
WP/19	3.2	Implementation strategy for aeronautical charting	Secretariat
WP/20	3.2	Project Loon – Floating cell phone towers in the sky	CANSO
WP/21	3.2	Support for a global TBO concept	USA
WP/22	7	Implementation of ICAO’s policies on charges in Doc 9082	IATA

Number	Agenda Item	Title	Prepared and presented by
WP/23	3.2	Promotion of cyber resilience through global awareness and regional exercises	USA
WP/24	7	Follow-up to the work of the GREPECAS Scrutiny Working Group	Rapporteur GTE
WP/25	4.6	Challenges in e-TOD implementation in the SAM Region	Secretariat
WP/26	6	Standard Project Methodology for RASG-PA and GREPECAS	Secretariat
WP/27	7	Amendment of the CARSAMMA Terms of Reference and approval of the Guidance Manual for Points of Contact (POCs)	Rapporteur GTE
WP/28	3.2	CANSO ATFM Data Exchange Network for the Americas (CADENA)	ALTA CANSO COCESNA IATA
WP/29	4.6	Electronic Terrain and Obstacle Data (eTOD) Main Challenges in the CAR Region	Secretariat
WP/30	7	Promotion of sustainable airport governance	IATA
WP/31	3.2	CAR/SAM Regional Air Navigation Plan - Volume III (Document 8733 eANP)	IATA
WP/32	4.5	GREPECAS collaborative framework of stakeholder engagement for all airport infrastructure development projects	IATA
WP/33	4.3	FPL - Regional harmonization and best practices	IATA
WP/34	6	Review of the GREPECAS terms of reference and work programme	Secretariat
WP/35	4.5	Lack of Regional Harmonization for PBN Implementation	Dominican Republic
WP/36	3.2	Performance Based Approach Applied to Regional Implementation Planning	Dominican Republic
WP/37	3.2	PBN approach charts – Transition from RNAV to RNP	Secretariat
WP/38	3.2	Enhancing support for safety management implementation	Secretariat
WP/39	3.2	Awareness and training on Civil Aviation Cyber Security	Secretariat
WP/40	3.2	Progress of the Informal Group for the Improvement of Air Traffic Services over the South Atlantic (SAT) (English only)	Secretariat
WP/41	2.2	Improving runway safety by increasing the number of ICAO Runway Safety Go-Team (RST) missions in the Caribbean/South America (CAR/SAM) Region	USA

### INFORMATION PAPERS

Number	Agenda Item	Title	Prepared and presented by
IP/01	--	General information (Revised)	Secretariat
IP/02	--	List of working papers and information papers	Secretariat
IP/03	3.2	Thirteenth Air Navigation Conference (AN-Conf/13)	Secretariat
IP/04	7	IATA Regional Security Strategy and the establishment of an Industry Security Focus Group	IATA
IP/05	7	UAS Integration Pilot Program	USA
IP/06	7	Surface safety, managing risk of runway and taxiway collision and runway excursions	USA
NI/07	4.3	Status and lessons learned, AIDC implementation	Dominican Republic
NI/08	4.2	Implementation of the ATFM/CDM Concept in the Dominican Republic	Dominican Republic
NI/09	7	Implementation and Certification of the Safety Management System (SMS) of the Air Navigation Services Provider in the Dominican Republic	Dominican Republic
NI/10	7	Mitigating actions implemented by the Dominican Republic for the reduction of LHD events in the FIR Santo Domingo	Dominican Republic
NI/11	4.1	State of implementation of PBN in the Dominican Republic	Dominican Republic
IP/12	4.3	Projects under the Automation and ATM Situational Awareness Programme (BO-RSEQ, B0-FICE, B0-SNET, B0-ASUR and B0-SURF)	IATA
IP/13	3.2	Latest AIM developments	Secretariat
IP/14	4.5	GREPECAS Airport Planning Project for SAM Region	Secretariat
IP/15	3.2	Planning and Implementation Regional Group (PIRG) activities in other Regions (English only)	Secretariat
IP/16	7	Academia Superior de Ciencias Aeronáuticas: Initiatives That Support the States and Service Providers of the Region in the Successful Implementation of State Safety Program (SSP) and Safety Management System (SMS)	Dominican Republic
IP/17	7	FAA's "Portal for International Pilot Deviations," Electronic Referral of Enforcement Cases	USA
IP/18	4.8	Estado de Cumplimiento de las Metas de Seguridad Operacional de la Declaración de Puerto España por parte de la República Dominicana ( <i>Spanish only</i> )	Dominican Republic
IP/19	2.1	Dominican Republic State Safety Program Strategy and Implementation Status	Dominican Republic
IP/20	2.1	Dominican Republic air navigation service provider ANSP safety management system (SMS) acceptance process	Dominican Republic
IP/21	7	Collaborative Arrangement for the Prevention and Management of Public Health Events in Civil Aviation (CAPSCA)	Dominican Republic

**PRESENTATIONS**

<b>Number</b>	<b>Agenda Item</b>	<b>Title</b>	<b>Prepared and presented by</b>
P/01	3.2	Emerging issues in aviation & international cooperation	United Arab Emirates
P/02	3.2	Ciberseguridad: La experiencia cubana en la implementación de un marco regulatorio ( <i>Spanish only</i> )	Cuba
P/03	3.2	Update on Cybersecurity: the Trust Framework	Secretariat
P/04	3.2	ASBUs Translated for non-engineering leaders	Secretariat
-	3.2	CADENA Video	CANSO

**Agenda Item 1: Follow-up on the results of the PPRC/3 and PPRC/4 meetings and analysis of GREPECAS Conclusions**

**1.1 Follow-up on the results of the PPRC/3 and PPRC/4 meetings**

Under this Agenda Item, the following working paper was discussed:

➤ WP/02 (Secretariat)

1.1.1 The Meeting took note of the results of the third and fourth meetings of the GREPECAS Programmes and Projects Review Committee (PPRC/3 and PPRC/4).

1.1.2 The PPRC/3 Meeting reviewed GREPECAS projects, the consolidation of GREPECAS/RASG-PA coordination, the setting of target dates for the circulation of proposals of amendment to the three volumes of the CAR/SAM e-ANP, and the drafting and issuance of National performance-based air navigation plans. It also formulated 8 draft conclusions and 2 draft decisions, which were approved as “GREPECAS conclusions and decisions” using the “fast-track” procedure, through a State letter dated 5 November 2015.

1.1.3 The PPRC/4 meeting reviewed the Projects, “U” deficiencies in the air navigation field the e-ANP, the follow-up on the 39<sup>th</sup> ICAO Assembly and the achievements of the Declarations of Bogota and of Port-of-Spain. It also issued 4 draft conclusions, 2 draft decisions, reactivated three projects in the CAR Region and authorised a new project in the SAM Region. Draft conclusions and decisions were approved using the “fast-track” procedure, through a State Letter dated 7 November 2016.

1.1.4 Upon reviewing PPRC/3 and PPRC/4 conclusions, the Meeting noted the persistence of low availability and lack of commitment from experts designated by States for project implementation, and States were urged to solve this issue.

**1.2 Review of action taken regarding GREPECAS valid conclusions**

Under this Agenda Item, the following working paper was discussed:

➤ WP/03 (Secretariat)

1.2.1 The Meeting reviewed GREPECAS and PPRC valid conclusions. Of the conclusions and decisions formulated by the PPRC/3 and PPRC/4 meetings, 4 conclusions and decisions of the PPRC/3 and 4 of the PPRC/4 were still valid, which the Meeting agreed to recode as GREPECAS/18 conclusions. This recoding appears in **Appendix A** to this part of the report, updated based on the results of the discussions held at this Meeting.

## APPENDIX B

## Recoding Conclusions and Decisions adopted during PPRC/3 and PPRC/4

Conc/Dec and Strategic Objective <sup>1</sup>	Title of the Conclusion/Decision	Text of the Conclusion/Decision
GREPECAS/18 C-18/1 A y B	Actions for ATFM Implementation in the CAR Region	That, States and Territories of the CAR Region, in their ATFM implementation projects:  a) implement as soon as possible, ATFM Positions (FMP) or ATFM units (FMU) in order to avoid an imbalance between capacity and demand, either by scheduled or by unforeseen events; and  b) ICAO NACC Regional Office take the corresponding actions to develop a proposal for amendment to Doc 7030 concerning ATFM procedures and ATC minimum separation for aircraft transfer between adjacent Control Centres (ACC) counting with overlying radar coverage, as applicable, informing PPRC/4 meeting on the progress of such actions.
GREPECAS/18 D 18/2 A	Establishment of a Working Group to obtain better AMHS operational use	That, in order to exploit AMHS potentialities and take advantage of its operational use:  a) a working group is formed by Brazil, Dominican Republic, United States and D Programme coordinators in the CAR and SAM Regions for ground- ground and air-ground communications infrastructure;  b) the working group will work through virtual meetings and will prepare a strategy to ensure AMHS operational use, providing it to the Region disposal as soon as practicable.
GREPECAS/18 C-18/3  A y B	Revision of the MET Programme and its tasks	That,  a) QMS/MET implementation be measured by certification, through a QMS certifying firm on aeronautical meteorology services;  b) States that have obtained QMS/MET system certification, submit a copy of their certificates to the Secretariat;
GREPECAS/18 C-18/4 A,B y E	Development of air navigation plans aligned with the GANP and the regional performance-based air navigation plans	That, the CAR/SAM Regions States that have not yet amended or developed their National Plans aligned with the Global Air Navigation Plan (GANP) (4 <sup>th</sup> edition) and the RPBANIP and SAM PBIP, complete them shortly in order to harmonize the implementation and facilitate the interoperability of systems and inter and intra-regional air navigation systems and services.

<sup>1</sup> ICAO established the following Strategic Objectives for the period 2014-2016:

*A - Safety*

*B – Air navigation capacity and efficiency*

*E- Environmental protection*

Conc/Dec and Strategic Objective <sup>1</sup>	Title of the Conclusion/Decision	Text of the Conclusion/Decision
GREPECAS/18 D-18/5 A y B	Improved data collection process for the treatment of deficiencies reported by IFALPA and IATA	<p>In order to improve the data collection process for the treatment of deficiencies reported by IFALPA and IATA, the NACC and SAM Regional Offices:</p> <ul style="list-style-type: none"> <li>a) starting on the second half of 2016, will hold teleconferences with IATA and IFALPA to share and validate the information on the deficiencies identified by these organisations; and</li> <li>b) will inform their accredited States, via teleconferences, about the deficiencies identified in order to seek their resolution and/or the adoption of the corresponding action.</li> </ul>
GREPECAS / 18 C-18/6 A y B	Resolution of aeronautical meteorology deficiencies	<p>That, in order to resolve aeronautical meteorology deficiencies associated to its personnel, and in order to have in their staff aeronautical meteorologists that meet the training requirements of the World Meteorological Organization, CAR/SAM States and Territories that present this deficiency:</p> <ul style="list-style-type: none"> <li>a) develop and conduct professional training courses for aeronautical meteorologists, aligned with the BIP-M contained in WMO Publication No. 1083, in partnership with universities, CATCs or tertiary non-university training institutions that meet education quality standards;</li> <li>b) create cooperation links with the permanent representatives of their States to the WMO in order to have access to WMO-approved personnel remote training courses offered by universities and international institutes;</li> <li>c) develop and implement a programme to link university meteorological staff or technical personnel with the aeronautical meteorology units of air navigation services in the short and medium term; and</li> <li>d) inform the respective ICAO Regional Offices at GREPECAS/18 about their plans to develop and conduct aeronautical meteorology training courses aligned with the BIP-M contained in WMO Publication No. 1083.</li> </ul>
GREPECAS/18 D-18/7 A, B y E	Postponement of the approval of VOL. III of CAR/SAM eANP	<p>That, taking into account that ICAO is preparing the updated version of the GANP for 2019 and the importance of aligning Volume III to the requirements thereof,</p> <ul style="list-style-type: none"> <li>a) The Secretariat defers the distribution of Vol. III of the CAR/SAM e-ANP until completing its alignment with the sixth version of the GANP.</li> <li>b) Since the GANP will address the performance-based implementation issue in more detail in its sixth edition, the States are urged to continue using the Regional Performance-Based Implementation Plans (SAM-PBIP and RPBANIP) for drafting their national air navigation plans.</li> </ul>
GREPECAS / 18 C-18/8 A y B	Greater support from States to AGA issues and projects	That States show a stronger commitment and take more effective action in support of GREPECAS AGA Projects, and designate AGA experts as focal points by 30 November 2016 in order to support the implementation of Aerodrome Certification activities.

**Agenda Item 2      Review of coordination activities between GREPECAS and RASG-PA****2.1      Regional activities of RASG-PA**

Under this agenda item, the following working and information papers were discussed:

- WP/04 (Secretariat), IP/19 (Dominican Republic), IP/20 (Dominican Republic)

2.1.1      The Meeting took note of the progress achieved, status of implementation of the projects and deliverables of the Regional Aviation Safety Group – Pan America (RASG-PA), including adjustments made in 2016 to the RASG structure and the results obtained by the RASG-PA. In the results, a) a recommendation made to ICAO regarding FDAP on amendment 6 to Annex 6, Part I, paragraphs 3.3.1 and 3.3.2., on broadening the flight data monitoring programme (FDMP)/flight data analysis programme (FDAP), and b) publication of the Annual Regional Safety Report, was highlighted.

2.1.2      Although showing a downward trend, the Meeting still recognised that the main safety categories of interest in the Regions continued to be: Loss of Control in Flight (LOC-I), Runway Excursions (RE), Controlled Flight into Terrain (CFIT), and Mid-Air Collision (MAC).

2.1.3      The Meeting highlighted that RASG-PA continued to be the safety focal point in the Pan American Region, ensuring harmonisation and coordination of efforts to collectively reduce aviation safety risk, in coordination with all aviation stakeholders.

**2.2      Coordination activities between GREPECAS and RASG-PA**

Under this agenda item, the following working papers were discussed:

- WP/05 (Secretariat), WP/41 (USA)

2.2.1      The Meeting took note of coordination activities carried out between RASG-PA and GREPECAS pursuant to the mandate of the ICAO Council, and identified coordination opportunities, mainly with respect to the runway excursions (RE) analysed by RASG-PA, the work of the RST concerning GREPECAS F projects, the benefits derived from the implementation of ATS routes by GREPECAS and their impact on reducing TCAS RAs analysed by RASG-PA, the runway safety team (RST) mission to Aruba, and the work done by the GREPECAS Scrutiny Group (GTE) to analyse LHDs outcomes with the PA-RAST MAC group, amongst other activities.

2.2.2      The Meeting took note of the initiative of the United States regarding a work mechanism whereby GREPECAS Programme F (AGA) would prioritise the implementation of improvements and the conduct of assistance missions for the establishment of Runway Safety Teams (RSTs), based on safety information derived from the analysis conducted by RASG-PA experts. The Meeting endorsed the proposal, and therefore the GREPECAS Secretariat would include the establishment of such mechanism as part of the coordination activities with RASG-PA, within the context of the proposal to reformulate Project F, as discussed under agenda item 4.

2.2.3 The Meeting recognised that a key element for improving collaboration between RASG-PA and GREPECAS, was a more active participation by States in both regional groups. It was also recommended to consider optimising coordination of activities between RASG-PA and GREPECAS. To this end, it was proposed to create an Ad hoc group to study opportunities for improving coordination. This Ad hoc group would consist of three CAR States and three SAM States, led by the GREPECAS Secretariat. The members of this Ad hoc group should preferably be States participating in both GREPECAS and RASG-PA. Mr. Roberto Sosa and Mr. Eddian Mendez, officers of the ICAO SAM and NACC Regional Offices, would be the focal points of the GREPECAS Secretariat. In order to fulfil this task, it was considered that a period of four months would be needed to submit recommendations to the GREPECAS Secretariat. In this regard, the following decision was adopted:

<b>DECISION</b>	
<b>GREPECAS 18/9</b>	<b>AD HOC GROUP TO ANALYSE GREPECAS - RASG-PA COORDINATION IMPROVEMENTS</b>
<p><b>What:</b></p> <p>That, in order to identify possible improvements in GREPECAS – RASG-PA coordination, the establishment of an <i>ad hoc</i> group, formed by Bolivia, Brazil, Chile, Dominican Republic, Trinidad and Tobago and United States, led by ICAO, is agreed, with the purpose of:</p> <p>a) studying opportunities for improving coordination between GREPECAS and RASG-PA;</p> <p>b) performing its tasks through electronic media; and</p> <p>c) submitting its recommendations to the ICAO Secretariat by <b>31 August 2018</b>.</p>	<p><b>Expected impact:</b></p> <p><input type="checkbox"/> Political / Global</p> <p><input checked="" type="checkbox"/> Inter-regional</p> <p><input type="checkbox"/> Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Operational/Technical</p>
<p><b>Why:</b></p> <p>To improve synergies between GREPECAS and RASG-PA, to achieve more effective over-all implementation</p>	
<p><b>When:</b> 31 August 2018</p>	<p><b>Status:</b> Adopted by GREPECAS/18</p>
<p><b>Who:</b> <input type="checkbox"/> Coordinators <input type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> Others: ADHOC Group</p>	

2.2.4 The Dominican Republic presented the status of implementation of its SSP, called PEGSO, describing the strategy applied, the high-level commitment adopted for its implementation, and the various activities carried out for defining the ALOS.

2.2.5 Dominican Republic described the SMS acceptance process being applied with the various service providers, ensuring the transition from a safety oversight based on a regulatory approach to a performance-based proactive approach.

## Agenda Item 3      Air navigation activities at global, inter-regional and intra-regional level

### 3.1      Results of the ICAO Assembly – 39th Session

Under this agenda item, the following working paper was discussed:

➤      WP/06 (Secretariat)

3.1.1      The Meeting reviewed the resolutions of the 39<sup>th</sup> ICAO Assembly affecting air navigation activities. In this regard, the Meeting noted that resolutions A39/11, A39/12, A39/15, A39/18, A39/19, A39/22 called for action to be taken by States in air navigation service areas in order to comply with that requested by the Assembly.

3.1.2      Upon reviewing the aforementioned resolutions, the Meeting adopted the following conclusion:

<b>CONCLUSION GREPECAS/18/10      FOLLOW-UP TO THE IMPLEMENTATION OF A39 RESOLUTIONS RELATED TO AIR NAVIGATION</b>	
<p><b>What:</b></p> <p>That CAR/SAM States,</p> <p>a)      resort to regional organisations for the establishment of the required mechanisms to address legal or institutional issues that might hinder CNS/ATM implementation;</p> <p>b)      amend their ANPs, taking into account the GANP 2015 and the regional performance-based implementation plans, and aligned with ASBU;</p> <p>c)      inform air navigation service providers and aerodrome operators of the need to fulfil the commitments derived from Article 28 of the Chicago Convention, and of the importance of quality in the aforementioned services;</p> <p>d)      include policies and action plans to address cases of unlawful interference in their area of responsibility, in their air navigation and aerodrome contingency plans, if not done yet, and inform the Regional Office thereof no later than the PPRC/5 meeting;</p>	<p><b>Expected impact:</b></p> <p><input checked="" type="checkbox"/> Political / Global</p> <p><input checked="" type="checkbox"/> Inter-regional</p> <p><input checked="" type="checkbox"/> Economic</p> <p><input checked="" type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Operational/Technical</p>

<p>e) partner with aviation providers, operators, and stakeholders at national and regional level for the establishment of procedures to mitigate cyber threats to the aviation system; and</p> <p>f) publish differences in their aeronautical information publications (AIPs) and use the electronic filing of differences (EFOD) to report them to ICAO.</p>	
<p><b>Why:</b> To complete the implementation of Assembly 39 resolutions related to air navigation.</p>	
<p><b>When:</b> Before PPRC/5</p>	<p><b>Status:</b> Adopted by GREPECAS/18</p>
<p><b>Who:</b> <input type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Others:</p>	

### 3.2 Follow-up on the implementation of global, inter-regional and intra-regional activities

Under this agenda item, the Meeting took note of the following working papers, information papers and presentation:

- WP /07 (Secretariat), WP /19 (Secretariat), WP /20 (CANSO), WP /21 (United States), WP/23 (United States), WP /28 (CANSO), WP /31 (IATA), WP/36 (Dominican Republic), WP/37 (Secretariat), WP/38 (Secretariat), WP/39 (Secretariat), WP/40 (Secretariat), IP/03 (Secretariat), IP/13 (Secretariat), IP/15 (Secretariat), P/01 (United Arab Emirates)

#### Presentation by the United Arab Emirates (UAE)

3.2.1 The United Arab Emirates made a presentation that highlighted the following points:

- The importance of collaboration and exchange among States and all stakeholders as a pre-condition for the development of an effective and coordinated global framework to address cyber security challenges in civil aviation.
- New technologies vs. regulation, as in the case of autonomous air taxis, which support the development of new technologies while maintaining a high level of safety. The UAE registered the first autonomous air taxi, seeking to establish the operational requirements for the implementation of services in the next five years, when new laws and policies will be issued to govern the certification of this type of aircraft, following best practices and ICAO guidance.
- Support to ICAO's next generation of aviation professionals (NGAP) to address the scarcity of aviation professionals and define strategies to ensure the availability of qualified and competent aviation professionals to operate, manage and maintain the future international air transport system. Emphasis was placed on support given by A39-30 to capacity building and by the UAE to gender equality for women in aviation.

### **CAR/SAM inter-regional activities**

3.2.2 Regarding inter-regional activities carried out by the CAR and SAM Regions, the Meeting agreed that inter-regional coordination between the two Regions was paramount when planning the implementation of services, procedures and equipment. A series of inter-regional CNS and ATM activities were presented, with emphasis on those that furthered GBAS and ADS-B implementation. Likewise, the Meeting took note of inter-regional AGA and MET activities within the scope of airport certification and volcanic ash SIGMET testing, respectively.

3.2.3 The annual programmes and projects coordination (PPRC) meetings and GREPECAS itself had been discussing CAR/SAM inter-regional aspects in the past years in relation to the results obtained at the teleconferences, work meetings, seminars and workshops.

3.2.4 It was noted that CAR and SAM implementation forums had identified the need to hold inter-regional face-to-face meetings to harmonise and proceed with the implementation of PBN and ATFM, reduced longitudinal separation, voice and data services, and, primarily, for representatives of States located along common CAR and SAM regional boundaries to update or sign ATS letters of operational agreement and CNS memoranda of understanding.

3.2.5 This initiative did not contemplate the creation of new periodic meetings or a parallel programme. Accordingly, the NACC and SAM Offices were currently coordinating the participation of delegates from the neighbouring Region, as needed, at scheduled meetings of the air navigation implementation working groups (ANI/WG and SAM/IG) to sign the aforementioned LOAs or MOUs.

### **Support to the global TBO concept**

3.2.6 The Meeting took note of the efforts being carried out by the Federal Aviation Administration (FAA) to evolve towards a trajectory-based operational environment (TBO), which envisaged the transition from a tactical separation and surveillance structure to a more strategic time-based management system. With TBO, an aircraft would arrive at a waypoint within seconds of an agreed upon flight plan time, boosting the capacity of the national airspace system (NAS) while decreasing congestion and fuel burn, applying tools to minimise the possibility of operational errors related to voice communications. It was noted that FAA efforts to transition to TBO were in concert with the TBO concept contained in ICAO Doc 9854.

### **Loon Project**

3.2.7 The Meeting took note of the Loon Project, a high-altitude, fee unmanned balloon network that aimed to bring the Internet to underserved parts of the world, and on activities conducted in support of natural disasters in Peru and Puerto Rico. Likewise, it was noted that they were getting ready for the hurricane season this year and were assessing their capacity to assist the Caribbean islands in case of an unfortunate occurrence. The Loon Project informed that they were not equipped with any military devices nor carried cameras or had surveillance capacity, aside from ADS-B. The request was made to sign letters of agreement to facilitate oversight and landing sites, as well as balloon navigation and equipage issues. The Meeting expressed its concern regarding possible incidents that might have affected air navigation during the initial climb and final descent of these balloons, and which might have accidentally interfered with the path of aircraft in flight. The Meeting was informed that, although no safety incidents had occurred so far, Loon was working on improving its safety management.

### **CANSO Air Traffic Flow Management Data Exchange Network for the Americas (CADENA)**

3.2.8 The Meeting took note of the progress made in the CANSO ATFM Data Exchange Network for the Americas (CADENA). This initiative offered a regional, cross-regional ATM communication protocol and an operational environment that incorporated operational procedures and practices. Every Friday, CADENA conducted ATFM planning videoconferences applying CDM among ANSPs, users and international organisations. It was noted that, in August 2017, CADENA launched the Operational Information System (OIS) website, which allowed for common situational awareness and the exchange of information on delays, trends, current/scheduled air traffic management measures, etc.

3.2.9 The Meeting acknowledged the usefulness and support of CADENA for the consolidation of the inter-regional CDM environment, and agreed that operational information exchange organised by CADENA was an important element of CDM that, in addition to others, supported the air traffic flow management (ATFM) concept, in accordance with ICAO Doc 9971, third edition.

3.2.10 It was highlighted that ATFM was being implemented in the Regions through GREPECAS programmes under the leadership of the NACC and SAM Regional Offices, and had to be aligned with the respective implementation guides, *inter alia*, the CAR/SAM ATFM CONOPS, as set forth in the report to agenda item 4. The Secretariat identified the benefit of some of these initiatives as well as the commitment in continuing to assume the ICAO leadership in these initiatives, as it is its mandate.

### **ICAO Implementation strategy for aeronautical charting**

3.2.11 The Meeting was provided with a high-level description of the ICAO implementation strategy to increase quality in aeronautical charting products and their compliance with the ICAO standards. ICAO proposed a two-phase approach for the implementation of the strategy: Phase 1 (short-term) and Phase 2 (long-term). Phase 1 of the implementation strategy would be initiated on the second half of this year (October/November 2018). Phase 2 would be initiated only when the first phase would be considered robust enough and creates the baseline for further steps. ICAO would refer the matter to the task forces in charge of GREPECAS Programme G for the development of a regional implementation strategy as a matter of priority.

3.2.12 The Meeting was also informed about the establishment of the Global Aeronautical Information Steering Group (AIM SG), which would support and facilitate the implementation of Standards and Recommended Practices (SARPs), procedures and guidance for the aeronautical information management (AIM) domain. The AIM-SG also identified the need for new SARPs, procedures and guidance to facilitate the integration of aeronautical information into System-Wide Information Management (SWIM) and identify and satisfy the upcoming aeronautical data and information requirements specific to the operation of unmanned aircraft systems. The Meeting was informed about the importance to participate in this group.

3.2.13 Regarding the above, the Meeting adopted the following decision:

<b>DECISION</b>	
<b>GREPECAS 18/11</b>	<b>CHARTING DEFICIENCY STRATEGY</b>
<b>What:</b>  That the task forces in charge of GREPECAS Programme G, in coordination with ICAO, address deficiencies in aeronautical charting should phase 2 of a regional implementation strategy be needed.	<b>Expected impact:</b>  <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Operational/Technical
<b>Why:</b> To support quality improvements in aeronautical charting.	
<b>When:</b> Before PPRC/5	<b>Status:</b> Adopted by GREPECAS/18
<b>Who:</b> <input type="checkbox"/> Coordinators <input type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Others:	

#### **PBN approach charts, transition from RNAV to RNP**

3.2.14 The Meeting was provided with high-level information on the transition plan being developed by ICAO for feedback from the regions. ICAO Regions would be requested to consider the transition from RNAV to RNP in the regional plans and ensure sufficient time was allocated to this task to successfully implement the new charts. ICAO would refer the matter to the regional groups in charge of GREPECAS Programme A for the development of a regional implementation strategy as a matter of priority.

3.2.15 Regarding the above, the Meeting adopted the following decision:

<b>DECISION</b>	
<b>GREPECAS 18/12</b>	<b>RNAV TO RNP CHARTING TRANSITION</b>
<b>What:</b>  That the task forces in charge of GREPECAS Programme A develop a Regional implementation strategy for the transition of RNAV to RNP approach chart as a matter of priority.	<b>Expected impact:</b>  <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Operational/Technical
<b>Why:</b> To support harmonised transition of chart nomenclature from RNAV to RNP.	
<b>When:</b> No later than June 2018. High priority.	<b>Status:</b> Adopted by GREPECAS/18
<b>Who:</b> <input type="checkbox"/> Coordinators <input type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Others:	

### Support to safety management implementation

3.2.16 ICAO reminded the Meeting that the 39<sup>th</sup> Assembly had expressed the need to provide more support for ICAO to assist States in the implementation of SSP and all activities related to safety oversight. Accordingly, the Secretariat announced in September 2016 the establishment of an ICAO Safety Management Programme, and outlined a series of deliverables, with defined timelines, to support SSP implementation:

- the drafting of the fourth edition of the *Safety Management Manual (SMM)* (Doc 9859), taking into account the changes made between the third and fourth edition. The advanced, unedited fourth edition of the *Safety Management Manual (SMM)* was only available in English at ICAO-NET (<https://portal.icao.int/icao-net>).
- The ICAO Safety Management Implementation (SMI) website. This was a public website that served as a repository for sharing examples and tools to support effective SSP and SMS implementation. This SMI public website was already available at: <https://www.icao.int/SMI>.

3.2.17 Regarding the above, the Meeting adopted the following conclusion.

CONCLUSION GREPECAS 18/13		SAFETY MANAGEMENT IMPLEMENTATION	
<b>What:</b>		<b>Expected impact:</b>	
That, in order to support the implementation of safety management, CAR/SAM States, international and regional organisations share tools and examples that support effective safety management implementation, to be posted on the Safety Management Implementation (SMI) website.		<input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Operational/Technical	
<b>Why:</b> To support safety management implementation.			
<b>When:</b> Before PPRC/5		<b>Status:</b> Adopted by GREPECAS/18	
<b>Who:</b> <input type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Others:			

### Thirteenth Air Navigation Conference

3.2.18 The Meeting took note that the 13<sup>th</sup> Air Navigation Conference would be held in Montreal, Canada, on 9-19 October 2018, with the objective of:

- drafting Assembly working papers on safety and air navigation to be submitted by the ICAO Council at the 40<sup>th</sup> Assembly

- allowing the Council to get a better idea of ICAO requirements in terms of safety and air navigation resources in order to prepare the budget to be submitted to the approval of the 40<sup>th</sup> Assembly Session
- allow the Assembly to focus on strategic issues based on sound technical counselling

3.2.19 States were urged to participate in the Conference and express their regional positions and support through the respective working papers.

### **Progress of the informal group for the improvement of air traffic services over the South Atlantic (SAT)**

3.2.20 The Meeting was informed on an on-going discussion to explore a better mechanism to increase efficiency in the management of flights in the airspace over the Atlantic, and improve necessary coordination among the regional groups concerned. The paper also provided information on the work in progress by ICAO in this regard.

3.2.21 Considering the outcome of the SAT and NATSPG meetings in the past two years, ICAO, including all Regional Offices concerned, initiated a study to analyse challenges and opportunities of both, SAT and NAT Regions, in an effort to develop a proposed way forward.

3.2.22 Several options were currently being analysed by the Secretariat. Once the proposals are mature, they will be presented to the next SAT meeting in June 2018, then to the relevant PIRG meetings for discussion and endorsement.

3.2.23 In an effort to improve implementation mechanisms, harmonisation and better use of resources, the Meeting agreed with the need to go forward with a study on formalising the SAT group structure and the possibilities of a better coordination with the NAT Region.

3.2.24 Regarding the above, the Meeting adopted the following conclusion.

<b>CONCLUSION</b>	
<b>GREPECAS/18/14</b>	<b>ENHANCEMENT OF SOUTH ATLANTIC (SAT) GROUP STRUCTURE</b>
<b>What:</b>  That a study be promoted on formalising the SAT group structure and the possibilities of a better coordination with the NAT Region.	<b>Expected impact:</b>  <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input checked="" type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Operational/Technical
<b>Why:</b> To support improvements to the coordination and implementation mechanism in the South Atlantic, and a better use of resources.	
<b>When:</b> Before the SAT/23 meeting.	<b>Status:</b> Adopted by GREPECAS/18
<b>Who:</b> <input type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input checked="" type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> Others: International and regional organizations	

### **Cyber security and cyber Resilience**

3.2.25 The Meeting took note of the results of the Civil Aviation Cyber Security Workshop, held in Montego Bay, Jamaica, on 20-23 March 2018. These results took into account action taken by the Cyber Security Programme of the ICAO and LACAC NAM/CAR and SAM Aviation Security and Facilitation Regional Group (AVSEC/FAL/RG). The Meeting concluded that State authorities should be aware of this important and delicate matter, and:

- assign the necessary resources for training of personnel at all levels of civil aviation, but mainly of information and communication technology (ICT) experts
- establish civil aviation cyber security incident response teams (CSIRTs)
- develop procedures based on national criteria to be applied by cyber security emergency response teams (CSERTs) for handling and countering potential attacks to civil aviation.

3.2.26 Regarding ICAO Assembly Resolution A39-19, the Meeting took note that ICAO was still working on a unified regulatory framework to strengthen cyber security, while the FAA was working with partners within the context of ICAO and with its partners in the Regions to identify threats and the risk of possible cyber security incidents in critical civil aviation operations and systems, and to promote a common interpretation of cyber threats, risks and mitigation of cyber incidents among all stakeholders.

3.2.27 The FAA proposed a model of cyber security exercise using facilitated discussions of scenarios to allow for an open exchange of ideas on various issues regarding a hypothetical and simulated cyber incident. This exercise could be used to enhance general awareness, validate existing plans and procedures, and assess the systems and activities that lie within the framework of cyber incident response and recovery. Greater efforts were required at the State and regional levels to work jointly towards the use of a successful model allowing for a common interpretation and the identification of issues in State policies and regulations, in order to begin developing a baseline framework to bolster cyber security and mitigate cyber incidents.

3.2.28 The Meeting endorsed these initiatives. Several States expressed their interest in participating in an initial exercise as proposed by the FAA, in coordination with ICAO, extending the scenarios to different air navigation areas involved in data management, especially electronic/digital critical data. The Director of Air Navigation of ICAO Headquarters noted that work was underway to have an initial means to counter, and recover from, attacks, with emphasis on data exchange, and urged CAR and SAM States to move forward on this important matter as soon as possible.

3.2.29 The Dominican Republic stated that it was working to resolve safety issues resulting from cyber attacks. Finally, the Secretariat requested the Meeting to make sure that the aeronautical community was aware of this delicate issue and to send their delegates to future cyber security training events.

3.2.30 The NACC Regional Office informed that a workshop on cyber security was being scheduled for late 2018. Similarly, Cuba shared its experience on cyber security within the scope of national cyber security efforts, and ICAO provided information on progress made in the development of guides and awareness raising.

### **CAR/SAM e-ANP, Volume III**

3.2.31 IATA recalled that, regarding Volume III of the electronic Regional Air Navigation Plan (e-ANP), ICAO recommended a performance-based approach for proper selection and implementation of the ASBU. Currently, there were two performance-based plans that were not harmonised: one for NAM/CAR and the other for SAM. In this sense, IATA considered that it was essential for all CAR/SAM stakeholders that Volume III of the CAR/SAM ANP replaced both performance-based implementation plans (NAM/CAR Regional Performance-Based Air Navigation Implementation Plan – RPBANIP - and Air Navigation System Performance-Based Air Navigation System Implementation Plan for the SAM Region - PBIP).

3.2.32 Furthermore, IATA highlighted that the development of Volume III of the CAR/SAM ANP, with the application of the PBA, would require experts of all stakeholders to receive the required information in order to apply the performance-based decision-making method, including the use of performance goals/indicators. In this sense, it would be advisable for ICAO Offices and States to conduct workshops on the aforementioned method.

3.2.33 The Secretariat reminded the Meeting that Decision PPRC/4-3 postponed the issuance of Volume III of the e-ANP in order to align it to the sixth edition of the GANP, scheduled for publication in 2019, which would explain performance-based implementation in more detail. The Meeting agreed on the importance of harmonising performance-based air navigation plans through the development of Volume III of the CAR/SAM ANP, pursuant to the aforementioned Decision PPRC/4-3.

3.2.34 The Dominican Republic noted the importance of using ICAO documents as a guide for the implementation of the performance-based approach, the establishment of clear performance objectives at a regional level, and the development of business cases for the solutions proposed for attaining the objectives. Mention was made of the need not only to measure the progress made in regional implementation, but also to assess whether the implemented elements generated the expected results in terms of performance, also conducting a cost-benefit analysis of implementation. The Meeting took note of these points for their discussion under agenda item 6, which included proposals for redesigning GREPECAS and RASG-PA programmes applying a standard project management methodology (PMI, PRINCE2, etc.).

**Agenda Item 4****Regional air navigation planning and implementation performance framework: Review of programmes and projects****4.1 Projects under the PBN Programme (B0-APTA, B0-FRTO, B0-CDO and B0-CCO)**

Under this agenda item, the following working and information papers were discussed:

- WP/08 (Secretariat), WP/35 (Dominican Republic), IP/11 (Dominican Republic)

4.1.1 The Meeting took note of the activities carried out in the CAR Region by the Air Navigation Implementation Working Group (ANI/WG) and by the PBN Task Force. It also noted that the NACC Office had conducted technical assistance missions (TEAM) on PBN under the “no country left behind” (NCLB) initiative. It was noted that 57.9 % of States had met the regional implementation goal for approach procedures. In the CAR Region, there were 217 instrument approach runways, out of which 108 had PBN procedures, amounting to 49.8 % implementation.

4.1.2 Based on the Performance-based navigation (PBN) harmonisation, modernisation, and implementation meetings, an amendment to Volume II of the CAR/SAM e-ANP was developed, allowing for the implementation of 41 improvement initiatives to advance in the adoption of more efficient RNAV-5 routes.

4.1.3 With the support of project RLA/09/801, the NACC Office promoted the development of a model airspace and terminal area (TMA) structure, which allowed for continuous flow in adjacent flight information regions (FIRs) and lower airspace TMAs, offering a possible solution to the complex structure of the existing CAR FIRs. Likewise, work is underway on a project to readjust the regional implementation metrics system, which will offer objective information for decision-making, in line with ASBU modules. **Appendix A** to this part of the report describes the progress made in the PBN project in the CAR Region.

4.1.4 Regarding implementation in the SAM Region, it was noted that the activities of the SAM Implementation Group (SAM/IG) focused on actions and results for the en-route, TMA and approach segments. It was noted that a proposed PBN operational concept (CONOPS) for SAM airspace had been developed, which had already been incorporated as Attachment H to the ATM section in the SAM-PBIP, version 1.5.

4.1.5 To date, 65% of upper airspace routes have been upgraded through the ATS/RO optimisation task force. In September 2017, activities started for the implementation of version 4 of ATS route improvements, the results of which would be implemented starting on the second half of 2018. Redesign processes applying PBN at the main TMAs were promoted through implementation workshops and SAM/IG meetings. Information was provided on PBN projects implemented in Paraguay, Colombia and Brazil in 2017.

4.1.6 A relevant aspect is the promotion of PANS-OPS training being provided to personnel of the administrations of Argentina, Bolivia, Ecuador, Guyana, Peru, and Uruguay, with which the PANS-OPS designer gap has been gradually closing in the Region.

4.1.7 Taking into account recent implementations in the Region, the implementation of PBN SIDs/STARs reached 72.9% in 2017. This is related to the application of CDO and CCO methods, which have reached 34% and 26% implementation, respectively. Regarding the implementation of PBN approaches, States continue to make progress and implementation reached 78.6% in 2017.

4.1.8 Likewise, with the support of project RLA/06/901, a workshop was conducted in November 2017, where an action plan was proposed to foster a reduction of the longitudinal separation from 40 to 20 NM for GNSS-equipped aircraft, and the signing and effective implementation of letters of agreement were coordinated between States. In this regard, Brazil had started standard implementation of a 20-NM separation for aircraft entering its FIRs. IATA underlined the importance of continued optimisation of longitudinal separation in the CAR and SAM Regions, under the PBN Programme. Project activities are described in detail in **Appendix B** to this part of the report.

4.1.9 Regarding Project A2 ‘Air navigation systems in support of PBN’ of the SAM Region, the practical guide for the implementation of GBAS systems continues to be reviewed, expecting the completion of a risk model by the last quarter of 2018. The activities under this Project are described in **Appendix C** to this part of the report.

4.1.10 In view of the foregoing, the Meeting took note of the progress made under the PBN Programme in the two Regions, and made some suggestions for improvement:

- a) Standardisation of enabling elements, scope and metrics of PBN projects and their tasks, in order to have harmonised implementation timelines and objectives.
- b) Harmonisation of concepts between the two Regions, for example, the model airspace and terminal area (TMA) structure of the CAR Region, and the PBN operational concept (CONOPS) for SAM airspace.
- c) A fundamental element for success in the projects was for CAR and SAM States to comply with their commitments regarding the activities defined by the working groups and the participation of decision-makers.
- d) Strengthening of inter-regional coordination and enhancement of State processes for publication and putting into service of new routes or optimised routes within the agreed timelines, which should be in line with the amendment to the regional e-ANP.
- e) Emphasis was placed on the benefits obtained when PBN implementation activities integrated cooperation initiatives and collaborative decision-making between States and, similarly, between States, ANSPs, users, and airlines.
- f) The importance of maintaining coordination through monthly or bimonthly teleconferences between the two Offices, with the participation of the States and users involved, as required, was highlighted.

## 4.2 Projects under the ATFM Programme (B0-SEQ, B0-FRTO, B0-NOPS and B0 ACDM)

Under this agenda item, the following working and information papers were discussed:

- WP/09 (Secretariat), IP/08 (Dominican Republic)

4.2.1 The Meeting took note that not much progress had been made in ATFM since the third meeting of the ANI/WG in April 2016. However, it was highlighted that several air navigation service providers (ANSP) from the region had taken concrete and well thought steps for the establishment of ATFM.

4.2.2 It was noted that some ANSPs that show progress in ATFM implementation, took static measures to restrict aircraft traffic, without taking into account basic ATFM principles, such as demand-capacity balancing and collaborative decision-making, causing delays and serious congestion in adjacent flight information regions.

4.2.3 In response to this situation, ICAO, with the support of the United States, had coordinated a basic training programme in ATFM, with the purpose of building the necessary capabilities to lead and carry out the ATFM implementation process. This training was delivered at the Miami Control Center in Miami in February 2018 and was attended by 12 States and International Organisations of the CAR/SAM Regions. The next of these trainings, under the coordination of the NACC Regional Office, was scheduled to take place at the Superior Academy of Aeronautical Sciences (ASCA) of the Dominican Republic on 4-8 June 2018.

4.2.4 It was noted that a limitation to ATFM implementation in the Region was the fact that the Air Traffic Flow Management Operational Concept for the Caribbean and South American Regions (CAR/SAM ATFM CONOPS), which had been developed in 2007, was out of date, and had to be updated based on Doc 9971, third edition, and in a harmonised manner between the two Regions, in accordance with the current operational reality. Consequently, the CAR/SAM ATFM CONOPS would be updated in order to have a planning guide for the implementation of CDM, ATFM and ACDM, for the sake of interoperability and efficiency, allowing States to mitigate demand-capacity imbalances.

4.2.5 Another aspect that should be taken into account was the need for greater involvement of aeronautical authorities in ATFM implementation efforts. Regional implementation initiatives have been channelled through air navigation service providers, without involving the CAA, which ultimately have the responsibility for regional agreements and should incorporate into their surveillance process aspects concerning capacity assessment and demand-capacity balancing.

4.2.6 At the CAR PBN and ATFM implementation meetings, States have coordinated the updating of ATS agreements with the corresponding air defence units, with a view to optimising the use of ATS airspace. In this regard, the NAM/CAR/SAM Civil-Military Coordination Meeting (Port of Spain, 25-28 October, 2016) addressed the application of the flexible use of airspace (FUA) concept, special use airspace (SUA), and collaborative decision-making (CDM) in the civil-military context.

4.2.7 Regarding progress made in the SAM Region, 85% of the States of the Region had made runway capacity calculations, as a pre-implementation task, maintaining that same percentage since PPRC/4. Regarding ATC sector calculations, it was noted that these had been carried out in nine States of the Region, that is, 64% of States had performed such calculations, highlighting activities in Ecuador, Bolivia and Argentina during 2017. The metric for the implementation of flow units/positions in the SAM Region reached 63% of the States, that is, 7% progress with respect to that reported at PPRC/4.

4.2.8 The Meeting considered that, for early implementation of ATFM, CAR and SAM States should implement and strengthen the functions of FMPs/FMUs with resources and trained personnel, and that they should be able to coordinate with ATS services the application of ATFM initiatives (TMI) in cases of capacity-demand imbalances caused by scheduled or unforeseen events.

4.2.9 The Meeting also stressed the importance of harmonising training initiatives and all implementation activities in the two Regions, always under the scope of the GREPECAS Programmes. Updated information on the ATFM Programme appears in **Appendix D** and in **Appendix E** to this part of the report for projects in the CAR and SAM Regions, respectively.

### **4.3 Projects under the Automation and ATM Situational Awareness Programme (BO-RSEQ, B0-FICE, B0-SNET, B0-ASUR and B0-SURF)**

Under this agenda item, the following working and information papers were discussed:

- WP/10 (Secretariat), WP/33 (IATA), IP/07 (Dominican Republic), IP/12 (IATA)

4.3.1 The Meeting took note of project activities under the Automation and ATM Situational Awareness Programme for the CAR/SAM Regions, and of the status of implementation of AIDC, ADS-B and multilateration.

4.3.2 AIDC implementation contributes directly to decision-making in a collaborative way, improves the situational awareness, fosters safety, and provides operational benefits among other benefits. Additionally, it helps to reduce separations between aircraft, manage seamless skies and reduce fuel consumption in the operations. AIDC implementation must contemplate flow management of flows, communications, data, surveillance, technical and operational procedures.

4.3.3 The Meeting was informed that one of the difficulties observed for the implementation are software incompatibilities, and noted the following:

- In the case of the NAM / ICD protocol, it operates through different kinds of messages, grouped in phase I, II and III, while the AIDC PAC version manages automatically the three phases from its beginning of implementation.
- Differences between ATM automated systems of different suppliers cause operational incompatibilities.

4.3.4 In this sense, at the ADS-B meeting (November 2017, Lima, Peru) the CAR / SAM Regions agreed that suppliers should commit themselves not only to the implementation and operation of the systems, but also to the integration with adjacent FIRs:

- It was noted that in the CAR region, the two main suppliers of ATM systems that have installed systems in the region, INDRA and THALES, had been contacted in order to reach agreements for operational integration and not only for the operation of ATM automated systems.
- States, on the other hand, were invited to incorporate in their technical requirements, the need for integration with adjacent FIRs.

4.3.5 The Meeting was informed that CAR / SAM States had taken measures for the correct issuance of flight plan. Measures included a mechanism for reducing errors in flight plans. It was pointed out that errors in the flight plan were a regional problem that caused concern due to their negative impact on automated coordination, and problems had been reported on several occasions. Assessments show that the classifications of the errors are caused by not complying of the PANS-ATM (Doc 4444), lack of knowledge of the personnel that manages the flight plans, human factor, management software tools, among others.

4.3.6 It was commented that as a mitigation measure, a training package required by the AIS / ARO and AIM personnel in charge of the management of flight plans has been prepared and will be presented at the Meeting of Training Centers Working Group of the NAM / CAR Regions, to be received and prepare the respective training courses. Similarly, the Meeting noted that in the week of 16 to 20 April, in Lima-Peru, the AIDC Implementation Meeting for the CAR/SAM Region will be conducted, where the participation of the States and the industry is expected to analyze the lessons learned, experiences of other regions, operational benefits and requirements for the implementation of the AIDC.

4.3.7 For the Projects of the Automation and ATM Situation Awareness Programme, the following improvement recommendations were taken:

- That the States integrate into the Project technical / operational requirements, the integration requirements with adjacent FIRs
- Participation of the appropriate personnel in the CAR / SAM Implementation Meeting of the AIDC (SAM Office, Lima, Peru from April 16 to 20).
- That the States commit themselves to take the corresponding corrective actions to carry out the implementation of the AIDC and decisions to minimize errors in the flight plan

4.3.8 The States, with regard to the implementation of the AIDC and flight plan, commented on the following:

- Dominican Republic: presented its problems and decisions to solve errors in flight plans. Also it was indicated the need for the involvement of all interested parties and to implement a good feedback mechanism for flight plan information.
- Venezuela: It exposed the activities that the State is carrying out in order to update its air traffic control systems,
- Ecuador informed of its updating plans and the implementation of an Automation Office for the management of this area.
- COCESNA: They indicate that next May they will sign an agreement with Ecuador to share surveillance data. In addition, they indicated that COCESNA is in the process of centralizing the management of flight plans and putting into operation a plan flight rejection system.

4.3.9 The GTE Group rapporteur recalled that in GREPECAS/15, the urgency of implementing the AIDC was expressed, and that the Secretariat provided continuous monitoring to the realization of these conclusions. They also indicated that there were several success stories in the implementation of the AIDC by reducing the LHDs in the FIRs that had been implemented, such as those of the FIR Havana-FIR Central American-FIR Mérida reduction of the LHDs. Effective implementation has a positive impact on safety.

4.3.10 IATA indicated that there is a need for a regional plan (CAR / SAM) for the implementation of the ADS-B. The Secretary indicated that she has been working on this, as reflected in the results obtained at the regional meeting in November 2017 and that will be complemented with the regional activities planned for 2018.

4.3.11 IATA noted that there is a requirement to harmonize the process of submitting flight plans in the CAR and SAM States. In this regard, IATA explained the need to generate a proposal to amend Doc. 7030, Supplementary Procedures, of ICAO, for the CAR and SAM Regions respectively, including, among other aspects, the harmonization of procedures for a delegation to airlines to originate FPLs and their update messages, as well as the harmonization of procedures to recognize the corresponding DEST ALTN aerodrome as an optional data. The background information on coordination carried out separately in the two Regions was detailed during the SAM / IG / 20 meetings of SAM and NACC / WG / 5 and AIM / FPL / AIDC / 1 of CAR.

4.3.12 The Meeting was informed that the proposal to amend Doc. 7030 was discussed in 2017 at the meetings of the SAM / IG and was not considered viable, and that the consensus of the SAM States was to support and continue to work on the activities of the AIDC group in project C1, where guidelines and procedures have been prepared to mitigate and reverse the weaknesses in the management of Flight Plans.

4.3.13 Finally, the Meeting agreed that the IATA proposal on the Flight Plan be discussed at the CAR / SAM AIDC Implementation Meeting.

4.3.14 In this regard, the Meeting considered replacing Conclusion CRPP/3/3 with the following conclusions:

<b>CONCLUSION GREPECAS18/15</b>		<b>INTERFACE CONTROL DOCUMENTS FOR AIDC IMPLEMENTATION</b>
<b>That:</b>		<b>Expected impact:</b>
For the implementation of the AIDC service between adjacent automated centers, it shall be adopted:		<input type="checkbox"/> Political / Global
a) AIDC / ASIA PAC Protocol Version 3.0 as the base document for the AIDC interconnections between the adjacent Control Centers between the CAR and SAM Regions. In the same way that it is the basis for interconnections in the SAM States; and		<input checked="" type="checkbox"/> Inter-regional
		<input type="checkbox"/> Economic
		<input type="checkbox"/> Environmental
b) that the CAR Region and the States adjacent to the United States use the NAM / ICD Protocol Version E or higher as the basis for its implementation.		<input checked="" type="checkbox"/> Operational/Technical

<b>Why:</b> Facilitate the implementation of the AIDC service between adjacent automated centers.	
<b>When:</b> Adoption from GREPECAS/18	<b>Status:</b> Adopted by GREPECAS/18
<b>Who:</b> <input type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input type="checkbox"/> OACI HQ <input type="checkbox"/> Others: XX	

<b>CONCLUSION</b>	
<b>GREPECAS 18/16</b>	<b>SHORT-TERM IMPLEMENTATION BY THE STATES OF AIDC FUNCTIONALITY</b>
<p><b>That:</b></p> <p>Radar data are shared between the FIRs of Curacao, Venezuela, the Dominican Republic, Ecuador and Central America.</p> <p>The States that possess the automation capacity installed in their ATC systems will promote the interconnection and start-up of their AIDC connections in the short term.</p> <p>It is invited to lead this initiative to the States of Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, Ecuador, Brazil, Argentina and Colombia.</p> <p>In the ATC systems update projects, the integration requirements with their adjacent FIRs are integrated within the technical / operational requirements.</p>	<p><b>Expected impact:</b></p> <p><input type="checkbox"/> Political / Global</p> <p><input checked="" type="checkbox"/> Inter-regional</p> <p><input checked="" type="checkbox"/> Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Operational/Technical</p>
<b>Why:</b> Improve safety using the benefits of AIDC to reduce LHDs that drives the Region's safety and efficiency	
<b>When:</b> That States submit ther AIDC implementation plans to ICAO Office before 30 August 2018.	<b>Status:</b> Adopted by GREPECAS/18
<b>Who:</b> <input type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Otros: XX	

<b>CONCLUSION GREPECAS 18/17</b>		<b>MEASURES TO REDUCE FLIGHT PLAN ERRORS</b>
<p><b>That:</b></p> <p>Considering the discussions regarding the problems to solve errors in flight plans and their negative impact in automated coordinations, and taking note that the correct presentation and processing of flight plans is essential for ADS-B, AIDC, ATFM implementation, among other concepts and functionalities, and considering that the errors in flight plans among the different FIRs generate LHDs that should be treated as a short term regional problem, the Meeting urged:</p> <p>a) NAM/CAR/SAM States and IATA to extensively discuss the problems in the AIDC Implementation Meeting of all the regions, to be carried out in Lima, Peru, from 16 to 29 April 2018;</p> <p>b) States to instruct their representatives assisting to the Lima meeting, to integrate local and regional solutions that could permit to solve these problems in a short term in the region; and</p> <p>c) States and IATA to commit themselves to implement mechanisms to solve errors in flight plans that may result of the meeting in Lima, before the end of December 2018.</p>	<p><b>Expected impact:</b></p> <p><input type="checkbox"/> Político / Global</p> <p><input checked="" type="checkbox"/> Inter-regional</p> <p><input type="checkbox"/> Económico</p> <p><input type="checkbox"/> Ambiental</p> <p><input checked="" type="checkbox"/> Técnico/Operacional</p>	
<p><b>Why:</b></p> <p>Minimize the negative impact of errors in flight plans in the automation and general management of operations in the region.</p>		
<p><b>When:</b> By December 2018.</p>		<p><b>Status:</b> Adopted by GREPECAS/18</p>
<p><b>Who:</b> <input type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Otros: XX</p>		

#### **4.4 Projects under the Ground-ground and Air-ground Telecommunication Infrastructure Programme (B0-FICE and B0-TBO)**

Under this agenda item, the following working paper was discussed:

- WP/11 (Secretariat)

4.4.1 The meeting took note of the CAR and SAM interregional activities of the Ground-Ground and Air-Ground Architecture Projects of the ATN (D1) and Applications of the Earth-Earth Communications Infrastructure Program / Air-Earth of the ATN (D2).

4.4.2 The Secretariat indicated that the most important points to emphasize is the AMHS implementation since AFTN systems do not support AIDC messaging, so a State that does not have AMHS will not be able to implement AIDC.

4.4.3 The Secretary informed to CURACAO that the procedure is ready, it was a coordinated work with all MEVA members led by ICAO with FAA support. The process is made to satisfy the needs of the States, fulfilling quality, security and a low-cost network.

4.4.4 Finally, the Secretariat recommended that within the PBN working groups, ATFM must include within its activities the need for the CNS infrastructure to carry out its goals.

4.4.5 In the CAR region, the AIM part is being worked in conjunction with the FAA to define the requirements of communications channels to support the AIM, and in the future the SWIM and the communication support mechanisms.

4.4.6 The SAM Region informed the advances in the AMHS implementation and its interconnections. It was highlighted that one of the achieved AMHS interconnections was between Brasilia and Madrid, which represents the first AMHS interconnection at an interregional level in the SAM Region.

4.4.7 The Meeting noted about the activities on the implementation of land-air data link applications (ADS-C and CPDLC). In 2017 the coordinations for its implementation were initiated in Peru and the Update of the AIRCON ATC simulator system with the inclusion of ADS-C and CPDLC functionality in the Lima ACC. On May 2017, positive ADS-C / CPDLC tests were performed with ARINC with a LATAM flight from. The next phase is the contracting of the "Connectivity Service for the Implementation of ADS-C Surveillance and CPDLC Communications in the FIR LIMA airspace" through a public bidding process that should be convened this year within the framework of the Contracting Law of the State of Peru. At this moment, the SAM Region has the ADSC / CPDLC installed in the Cayenne ACC (French Guiana), Atlantic ACC (Recife Brazil), Atlantic Oceanic ACC (Chile) and the Comodoro Oceanic ACC. The ADS C / CPDLC service of the Montevideo ACC (Uruguay) and the Ezeiza ACC (Oceanic) are in the pre-operational phase.

#### **4.5 Projects under the Aerodromes Programme (B0-SURF and B0-ACDM)**

Under this agenda item, the following working and information papers were discussed:

- WP/12 (Secretariat), WP/32 (IATA), IP/14 (Secretariat)

4.5.1 In relation to the Aerodromes Programme (Projects F1 on Aerodrome Certification and Projects F2 on Runway Safety Improvements), the Meeting took note of the discussions held at the PPRC/4 meeting regarding the little progress made in the AGA area in several States, due to a series of factors related to resources and commitment by the States. This was due to the establishment of objectives based on regional indicators instead of assigning goals by State and taking into account the individual contribution of each State to the indicator. This was reflected in the fact that the effort of a single State in each region could bring the indicator to its goal, while the other States were not making the corresponding effort for its achievement, which is the real purpose of the established goal.

4.5.2 Despite the above, aerodrome certification has evolved in both Regions as follows:

Region	Number of Aerodromes based on AOP table	Certified Aerodromes (PPRC/4, July 2016)	Certified aerodromes (GREPECAS, April 2018)	Actual %	Declaration goal (Dec 2016)
CAR	150	54	79	53%	48%
SAM	104	17	32	30%	20%

4.5.3 As indicated in section 4.5.1 of this report, the Secretariat presented a draft decision to unify projects F1 and F2 in both Regions, in order to seek efficiencies, given the limited resources and given that both Projects were closely related (an analysis indicated that projects F2 of both Regions and runway safety improvement were closely related to the objectives of the project F1). It should be noted that the description of the proposed project, such as the objective, scope, metrics, strategy, goals and rationale are found in **Appendix F** for CAR and **Appendix G** for SAM.

4.5.4 Five States (Brazil, Cuba, Panama, United States and Uruguay) took the floor to express their support to the draft decisions and draft conclusions, highlighting that the search for efficiencies in the AGA area (which started with 7 projects) was in line with the prioritisation of activities to attain the objective. One State urged the rest to learn about the mechanisms already available to help resolve the deficiencies. Another State expressed the need to address the problem in collaboration, since airport operators are a fundamental piece to meet the objective.

4.5.5 After analysing the benefits resulting from merging both projects, the Meeting adopted the following decision:

<b>DECISION</b> <b>GREPECAS 18/18</b>		<b>MERGING OF PROJECTS F1 AND F2 INTO A NEW PROJECT F1</b>	
<b>What:</b> To gain efficiency, Projects F1 and F2 of the GREPECAS Aerodromes and Ground Aids Programme (AGA) will be merged into a single Project F called " <i>Safety implementation and aerodrome certification project</i> "		<b>Expected impact:</b> <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Operational/Technical	
<b>Why:</b> Given the limited progress made by previous efforts and scarce resources (reported at PPRC / 4), it was proposed to merge the projects to gain efficiency, since both Projects were closely related.			
<b>When:</b> GREPECAS/18		<b>Status:</b> Adopted by GREPECAS/18	
<b>Who:</b> <input checked="" type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Others:			

4.5.6 Likewise, the various training activities carried out under the aerodrome certification strategy for both regions were described in detail.

4.5.7 The Meeting reviewed the draft conclusion of the Secretariat, where CAR and SAM States/Territories were requested to send to their respective Regional Offices a 3-year plan for the certification of their aerodromes, taking into account their contribution to the total of the Region. The Meeting approved the proposal and adopted the following conclusion:

<b>CONCLUSION GREPECAS 18/19</b>		<b>AERODROME CERTIFICATION PLAN</b>	
<b>What:</b> In order to better support and assist CAR and SAM States/aerodromes with the aerodrome certification process, the CAR/SAM States/Territories should send a 3-year plan to the respective ICAO Regional Office for the certification of their aerodromes, taking into account their contribution to the total of the Region		<b>Expected impact:</b> <input type="checkbox"/> Political / Global <input checked="" type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Operational/Technical	
<b>Why:</b> To better support and assist CAR and SAM States/aerodromes with the aerodrome certification process.			
<b>When:</b> 30 August 2018		<b>Status:</b> Adopted by GREPECAS/18	
<b>Who:</b> <input checked="" type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Others:			

### **GREPECAS airport planning and ACDM project proposals for the SAM Region**

4.5.8 The Secretariat presented two proposals for future projects on Airport Planning and Airport CDM for the SAM Region and invited the States to participate actively in their preparation. The Meeting took note of these proposals.

### **Collaborative framework to involve all stakeholders in airport infrastructure development projects**

4.5.9 IATA highlighted the need for States to establish a collaborative framework that involved all stakeholders (including airlines and airports) in the development of airport infrastructure projects.

4.5.10 The argument was based on the fact that, although the industry urgently required more airport capacity, investments made without taking into account user needs could have an impact as negative as not building anything. In addition, IATA considered that many of these capital investments and their operating costs were financed in part through airport charges. Therefore, it was important for investments to be made when there was a positive business case and a return on the investment for those who financed these projects.

4.5.11 This collaborative framework would be aligned with efforts underway to prepare a new project for Airport Planning, and with efforts agreed upon by SAM States at the RAAC/15 meeting, where the Secretariat was requested to assist States in improving their competencies to oversee the financial performance of their service providers.

#### 4.6 Projects under the AIM Programme (B0-DATM)

Under this agenda item, the following working papers were discussed:

- WP/13 (Secretariat), WP/25 (Secretariat), WP/29 (Secretariat)

4.6.1 The Secretariat referred to GREPECAS AIM Programmes and its Projects G1, G2 and G3 (CAR/SAM), in the transition to AIM, presenting the developments of the States regarding Aeronautical Information Exchange Model (AIXM 5.1), the implementation of the Quality Management System (QMS) and the availability of sets of electronic Terrain and Obstacle Data (eTOD).

##### CAR Region

4.6.2 Based on the AIM objectives of Air Navigation Services (ANS) of the “*No Country Left Behind*” (NCLB) strategy and under the ANIWG group, a Regional AIM Meeting was carried out in Tegucigalpa, Honduras in 2017, where the issues regarding Projects G1 and G2 were discussed regarding eTOD and QMS among others.

4.6.3 Regarding Project G1 (*eTOD*), in November 2015, the CAR/SAM Seminar on eTOD was carried out in the NACC Office, Mexico City. This event introduced the option with regard to the use of Drones for the surveying of Areas 2 and 3, and the establishment of Letters of Agreement (LoAs) among the States and national/international organizations to collaborate in the implementation of eTOD. Appendix A to WP/13 presents the estimated progress of project eTOD.

4.6.4 The Secretariat expressed its acceptance and gratitude to Cuba for its offer to provide experts as coordinators of Projects G1 and G2 of the CAR Region, which were vacant, thus, RO/AIM had to assume such coordination.

4.6.5 Regarding Project G2 (*QMS*) many States have already implemented or started the process of QMS implementation, with 83% estimated progress, presented for the *Declaration of POS* (Trinidad and Tobago, April 2014), under the integration of a QMS AIM System conformed by several States, as the case of the E/CAR States with Trinidad and Tobago as the centre of the project, following the COCESNA Model in Central America, and in Curacao, establishing LoAs with the States that prepare the Integrated Aeronautical Information Package (IAIP) integrating an AIM-QMS.

4.6.6 In **Appendix H** to this part of the report, a table with the main difficulties for the transition from AIS to AIM is included, which will be worked for their reduction or elimination in a short of medium term.

4.6.7 States were also requested to review the new PANS-AIM and amendment 40 to Annex15, in principle for the development of an AIM operational concept, which will progress beyond the current objective of the roadmap for the transition from AIS to AIM related to the AIM extended domain called “information management” (IM), which is becoming an urgent task in direct support of ATM and SWIM users.

4.6.8 In information provided by the Secretariat on the challenges and requirements to implement the eTOD by the States, in accordance with ICAO documents related to the integrity and precision of the data, data source collection methods, data management and maintenance, as well as quality standard considerations (Annex 15 and Doc 9881); it was identified that eTOD has direct impact in the design of PBN instrument flight procedures and the use of these data in electronic Aeronautical Cartography for Air Traffic Management Systems and Flight Management in aircraft, among many others.

4.6.9 The implementation of eTOD requirements are at the same time the main challenges that States shall bear in mind as follows:

- Implement suitable regulations to support eTOD gathering and data management concerning responsible State government authorities, Air Navigation Service Providers (ANSPs), aerodrome operators, the military, etc.
- Define the method to gather data, be it via topography (using WGS-84) or by other means (drones, satellite 3D graphic/LIDAR information processing).
- Define the format in which the data will be stored and distributed.
- Implement the required infrastructure (a database -GIS) capable of managing/hosting the eTOD data. (The database must be capable of loading the required terrain data in either Digital Surface Model (DSM) or Digital Terrain Model (DTM) format with associated Meta-Data traceability)
- Ensure the State has the required resources to manage and maintain the eTOD Database in coordination with the Military representatives (National Security issues)
- Ensure the resources of the State are adequately trained in managing terrain and obstacle data (i.e., understanding the complexities of terrain data file formats and packaging of these terrain data files).
- Ensure the State has implemented a Quality Management System (QMS) with associated processes and procedures to ensure quality in the processing of data from originator to publication (Controlled Harmonized Aeronautical Information Network – CHAIN) in the AIP AD 2.10 section (or other related IAIP documents).

### **Region SAM**

#### **Project G1 – “Developments for the supply of electronic terrain and obstacle data (e-TOD) in the States”**

4.6.10 The e-TOD project has progressed in the SAM Region States, but not as necessary. Some progress has been observed, but not as needed. States have presented their corrective action plan to eliminate the deficiency concerning e-TOD implementation, but finalizing this is not as expected, excepting some States.

4.6.11 With the support from a Regional Project, an e-TOD Seminar/Workshop where States identified difficulties and challenges for its implementation.

4.6.12 Concerning e-TOD implementation, Venezuela informed that it has a Terrain Digital Model supplied by NGA, and they are currently carrying out obstacle and terrain surveys up to 10 km surrounding the airports, in order to feed its database.

4.6.13 The Meeting observed difficulties concerning e-TOD, and therefore it decided to activate an Ad hoc Group in order to analyse them and design strategies leading to finalization of e-TOD implementation in line with the CAR Region. The recommendations of the activated Ad hoc Group are described in the AIM project conclusions.

#### **Project G2 - "Implementation of Aeronautical Information Exchange Systems (AIXM)"**

4.6.14 The Meeting noted that the implementation of AIXM has developed manuals for its implementation, based mainly on Eurocontrol documentation related to it.

4.6.15 The Meeting was informed that, test messages were exchanged between Argentina and Panama, and Peru - Brazil.

4.6.16 In relation to the AIXM, Venezuela reported that it has carried out staff training in the use of software for the management of aeronautical databases acquired from the industry.

4.6.17 Among the activities carried out, seminars related to "Databases for e-AIP" and SWIM were mentioned.

#### **Project G3 - "Implementation of the quality management system in AIM units in the SAM Region"**

4.6.18 The meeting noted that the Project for the implementation of the Quality Management System for the processes that manage the AIM units has made progress in terms of the activities necessary to carry out before the certification. The change of the ISO 9001 Standard in September 2015 has presented a new panorama for the States due to the fact that in September 2018 all certifications issued under the 2008 version of the ISO 9001 Standard expire. Currently, five States of the SAM Region already have been certified under the 2015 version of the Standard. Argentina and Uruguay, which have certified with the 2008 version of the Standard, have pending plans to adapt their QMS/AIM to the 2015 version.

#### **Difficulties faced in the implementation of projects under the AIM programme and conclusions**

4.6.19 Most States had not completed e-TOD implementation for Area 2 by 12 November 2015. States must be aware that, at this point, non-compliance with the standard has become a deficiency for those States that have not completed its implementation. Upon analysing that stated in 4.6.9 and 4.6.13, the Meeting decided to create an *ad hoc* group, with delegates of Panama, Costa Rica, Uruguay, Trinidad and Tobago, Brazil, Dominican Republic and the AIM/ROs of both CAR and SAM Regional Offices. Indications for the Meeting are contained in Appendix H to this part of the report.

4.6.20 Regarding AIXM implementation, initial tests were conducted. However, technical problems were observed, the resolution of which depended on other network-related areas (AMHS).

4.6.21 Regarding AIM/QMS implementation, there were problems with top management at the time of certifying quality management systems in the States. The Meeting urged the States to support the completion of AIM/QMS implementation processes. The Meeting noted that difficulties related to certification could be overcome through technical assistance under the regional projects.

#### **4.7 Projects under the Aeronautical Meteorology Programme (B0-AMET)**

Under this agenda item, the following working paper was discussed:

- WP/14 (Secretariat)

##### **CAR Region**

4.7.1 The Meeting was informed about the updating and strengthening of the projects of the MET Programme in the CAR Region within the framework of the strategy of the NACC Regional Office, and recognized the States that nominated project team members who are in charge of implementation.

4.7.2 Likewise, the Meeting was informed about the challenges on implementation, associated with the adoption of amendments 77 and 78 to Annex 3, so the States were invited to attend the ICAO interregional workshop on Model of exchange of meteorological information (IWXXM) and space meteorology, which will be held in the second half of 2018 in Panama.

4.7.3 Progress on the projects H2, H3 and H4 was presented, the most relevant activities were emphasized and the challenges faced by States linked to the implementation tasks were voiced, inviting the Meeting to participate more actively taking part of the projects and supporting an intensive and practical learning through sharing best practices and lessons learned.

##### **SAM Region**

4.7.4 The Meeting noted the activities carried out to develop the MET Projects in the Region.

4.7.5 Progress made on the Project H3 is linked to Volcanic Ashes drills. Those drills still have some opportunities for improvement. Additionally, the Manual on Volcanic Ash SIGMET was completed, and is currently under consultation by the States, to update data of points of contact and other information.

4.7.6 Regarding to Project H3, the Meeting noted that tasks to adapt the QMS/MET implanted and certified according to standard ISO 9001 version 2015, have been completed by, Brazil, Chile, Panama, Paraguay and Peru. Argentina, Colombia and Suriname have been certified with ISO version 2008, and have not adapted yet their QMS/MET to version 2015.

4.7.7 Project H4 has analyzed the reports of the OPMET data bank of Brasilia and the observations of operators regarding the OPMET message formats. Thru coordinated activities between States and the Secretariat, as missions and seminars, efficiency of data has been risen on 90%, reducing the formats errors to minimum. Additionally, States were accompanied for the transition to a digital environment and the management of the OPMET data within a SWIM environment. A seminar on SWIM and XML messages was held in October, in Lima - Peru. Ecuador and Venezuela and have developed programmes that transform the alphanumeric messages to XML formats. The transmission format XML/GML is part of the implementation of the IWXXM.

### **Conclusions and challenges related to the MET projects**

4.7.8 MET projects of GREPECAS have had limited development, targets have been partially achieved despite efforts to coordinate the activities through follow up teleconferences. It was necessary to reactivate meetings, readjust the scope of projects and agree the deliverables.

4.7.9 Regarding the implementation and subsequent certification of QMS/MET and the adaptation to requirements introduced by ISO 9001:2015 standard, the following challenges were observed:

- a) States that have completed the implementation, but have not obtained certification as the certification organizations do not have MET experts acting as Auditors, and therefore decide not to participate in tender processes of the State;
- b) States that have completed the implementation, but cannot certify because there are no certification organizations in the country; and
- c) States that have received the technical assistance, but have not completed the process of implantation due unexplained reasons.

4.7.10 States which have not completed the implementation process may submit an Action Plan to the Secretariat in order to receive support of Regional projects to finish the process of implementation and certification of QMS/MET.

4.7.11 The last two amendments to Annex 3, have important challenges of implementation that require the formulation and development of new projects. States, in order to implement these amendments should consider the necessary infrastructure for implementation of the ICAO Model of exchange of meteorological information (IWXXM), coordination at national and regional levels in cases of radioactive material release, and the provision of new MET services to fulfill requirements of the CDM and A-CDM environment, among other challenges related to the OPMET messages exchange and the qualification of aeronautical meteorology staff.

#### **4.8 Progress made in, and achievement of, the air navigation goals of the Declarations of Bogota and Port-of-Spain, and assessment of activities for the implementation of ASBU B1**

Under this agenda item, the following working and information papers were discussed:

- WP/15 (Secretariat), IP/18 (Dominican Republic)

4.8.1 Regarding the Declaration of Port of Spain, it was reported that the NACC/DCA/07 Meeting reported on the status of achievement of the goals, which mostly expired on December 31, 2016 and whose follow-up has been integrated within Action Plans in a continuous manner. The evaluation of the progress in the implementation, the identification of improvements and the review of goals, has been made through the recommendations of the ANI/WG that have been developed by the works and activities of the different Task Groups in support of the implementation. This effort is aligned with the strategy of "No Country Left Behind" (NCLB). The declaration of POS through the ANI/WG, has facilitated the harmonization of air navigation for the NAM/CAR Regions.

4.8.2 Likewise, it was reported that the Fourth Meeting of Directors of Air Navigation and Operational Safety (AN&FS/4) of the SAM Region analyzed the progress and achievements of the Goals of the Declaration of Bogota. The Fifteenth Meeting of Directors of Civil Aviation (RAAC/15) updated the achievements and progress made in reference to the same point. As the deadlines for the Declaration goals were met in December 2016, the groups supported by RLA/06/901 maintain the planning and execution within the scope of the implementation meetings, for MET, AIM, AGA, CNS and ATM. **Appendices I, J, K and L** of this part of the report summarize the progress made in these activities.

4.8.3 The Secretariat highlighted that the commitments of the Declarations of Bogota and Port of Spain have represented an effective integrating and commitment component for the progress obtained in the implementation of air navigation in the two Regions, without neglecting that these Declarations should to be considered as a political guide subscribed by the States in consensus. The Meeting was invited to continue working on the objectives of harmonized implementation, within a new project management scheme, which emphasizes the identification of needs at the level of States and Regions, and clearly defines relationships with users and all the parties concerned, as well as a new approach for accountability.

## APPENDIX A / APÉNDICE A

**PROJECT IMPLEMENTATION OF PERFORMANCE BASED NAVIGATION (PBN)  
PROYECTO IMPLANTACIÓN DE LA NAVEGACION BASADA EN LA PERFORMANCE (PBN)**

<i>CAR Region / Región CAR</i>	<b>PROJECT DESCRIPTION / DESCRIPCION DEL PROYECTO (DP)</b>	<b>DP N° A1</b>	
<i>Programme / Programa</i>	<b>Project Title / Título del Proyecto</b>	<b>Start / Fecha inicio</b>	<b>End / Fecha término</b>
<i>Performance Based Navigation /Navegación basada en la performance (PBN)  Programme Coordinator / Coordinador del Programma: Eddian Mendez)</i>	<i>Performance Based Navigation / Navegación Basada en la Performance (PBN)</i>  Project Coordinator / Coordinador Proyecto: Riaaz Mohamed (Trinidad and Tobago) Experts / Expertos contribuyentes: Carl Gayner (Jamaica) Jose Gil (México) Julio Mejia Alcantara (Dominican Republic) Marco Vidal(IATA)	2008	2017 <u>2018</u> <i>(new date /nueva fecha)</i>
<b>Objective /Objetivo</b>	Support the implementation of the ATS route structure in terminal areas (SID/STAR RNAV) and en-route (RNAV) optimization Project, as well as the implementation of RNP approach procedures according to regional performance objectives of the Performance-based Air Navigation Implementation Plan for NAM/CAR (RPBANIP NAM/CAR) Regions. / Apoyar la implementación del proyecto de optimización de la estructura de rutas ATS en las áreas terminales (SID/STAR RNAV) y espacio aéreo en ruta (RNAV), así como la implantación de aproximaciones RNP en base a los Objetivos regionales de performance del Plan de Regional de Implementación de Navegación Aérea Basada en la Performance para las Regiones NAM/CAR (RPBANIP NAM/CAR)		
<b>Scope /Alcance</b>	Progressive implementation of PBN and use of GNSS according to the goals of Assembly Resolution A37-11 and the PBN Airspace Concept for the CAR Region. / Implantación progresiva de la PBN y uso del GNSS acorde a las metas de la Resolución de la Asamblea A37-11 y el Concepto de Espacio Aéreo PBN para la Región CAR.		

<p><b>Metrics / Métricas</b></p>	<ul style="list-style-type: none"> <li>• Percentage of instrument runway 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;</li> <li>• Percentage of international aerodromes with implanted SID/STAR RNAV, RNP and continuous descent and climb operations (CDO/CCO);</li> <li>• Estimated fuel saved with operational improvements.</li> <li>• Porcentaje de pistas por instrumentos con un Procedimiento de aproximación con guía vertical (APV), (BARO-VNAV y/o aumentación GNSS) ya sea como aproximación primaria o como apoyo para aproximaciones de precisión;</li> <li>• Porcentaje de aeropuertos internacionales con SID/STAR RNAV, RNP y operaciones de descenso y ascenso continuo (CDO/CCO) implantados;</li> <li>• Ahorros estimados de combustible debidos a mejoras operacionales.</li> </ul>
<p><b>Strategy / Estrategia</b></p>	<p>The implementation of activities will be coordinated between Project members, the Project Coordinator and the Programme Coordinator. The Programme Coordinator will coordinate with the Project Coordinator requirements of other projects and NAM/CAR implementation working groups. States will develop their respective national programmes of implementation of routes and approach procedures according to PBN Airspace Concept in the CAR Region. Experts nominated by States, Territories and International Organizations will be incorporated to develop tasks as required. /</p> <p>La ejecución de las actividades será coordinada entre miembros del proyecto, el coordinador del proyecto y el Coordinador del Programa. El Coordinador del Programa coordinará con el Coordinador del Proyecto los requerimientos de otros proyectos y Grupos de Trabajo de implementación NAM/CAR. Los Estados elaborarán sus respectivos programas nacionales de implantación de rutas y procedimientos de aproximación acorde al Concepto de Espacio Aéreo PBN de la Región CAR. Se incorporarán expertos nominados por los Estados, Territorios y Organizaciones Internacionales para desarrollar las tareas, según se requiera.</p>
<p><b>Goals / Metas</b></p>	<ul style="list-style-type: none"> <li>• Implement RNAV/RNP routes and RNP approach procedures according to Assembly Resolution A37-11 in 2016:</li> <li>• Implement a PBN Airspace Redesign Project (CDOs, CCOs, SIDs, STARs, RNAV/RNP route and RNP approach procedures) in 8 FIRs by December 2018 (new date):</li> <li>• Implementar rutas RNAV/RNP y procedimientos de aproximación RNP de acuerdo a la Resolución de la Asamblea A37-11, en diciembre de 2016;</li> <li>• Implementar un Proyecto de Rediseño de Espacio Aéreo PBN (CDO, CCO, SID, STAR, rutas RNAV/RNP y procedimientos de aproximación RNP) en 8 FIR en diciembre de 2018 (nueva fecha)</li> </ul>

<p><b>Justification/ Justificación</b></p>	<p>The Assembly Resolution A37-11 on performance-based navigation (PBN) global goals, urged States to implement RNAV and RNP ATS routes and instrument approach procedures in accordance with the ICAO Performance-based Navigation (PBN) Manual, Doc 9613, and requested the PIRGs to include in their work programme the review of status of implementation of PBN by States and report annually to ICAO any deficiencies that may occur.</p> <p>In addition, NAM/CAR States adopted a regional performance framework on the basis of the regional performance objectives (RPO) of the performance based air navigation implementation plan (RPB-ANIP) for NAM/CAR Regions and the Global ATM Operational Concept. The framework includes the implementation of a set of performance metrics to facilitate comparative analysis of operational and economic regional development, such as capacity and efficiency of gate-to-gate flight operations, and the protection of the environment in the planning, implementation and operation processes of the ATM system. /</p> <p>La Resolución A37-11 de la Asamblea sobre metas mundiales de Navegación basada en performance (PBN), instó a los Estados a implantar rutas ATS RNAV y RNP, así como procedimientos de aproximación por instrumentos de acuerdo al Manual de la OACI sobre Navegación Basada en la Performance (PBN), Doc 9613, solicitando a los PIRG incluir en sus programas de trabajo la revisión del estado de implantación de PBN por los Estados e informar anualmente a la OACI sobre cualquier deficiencia que pudiera ocurrir.</p> <p>Además, los Estados NAM/CAR adoptaron un marco regional de performance con base en los Objetivos regionales de performance (RPO) del plan de implantación de navegación aérea basada en performance (RPB-ANIP) para las Regiones NAM/CAR y el Concepto Operacional ATM Global. El marco de referencia incluye la implantación de un conjunto de métricas de performance para facilitar el análisis comparativo operacional y económico del desarrollo regional, tales como la capacidad y eficiencia de operaciones aéreas puerta a puerta y la protección del medio ambiente en los procesos de planificación, implantación y operación del sistema ATM.</p>
<p><b>Related Projects / Proyectos relacionados</b></p>	<ul style="list-style-type: none"> <li>• Enhance demand and capacity balancing;</li> <li>• Flexible use of airspace;</li> <li>• Improve ATM situational awareness;</li> <li>• Mejorar el equilibrio entre la demanda y capacidad;</li> <li>• Uso flexible del espacio aéreo;</li> <li>• Mejorar la conciencia situacional ATM;</li> </ul>

Resultados entregables del Proyecto	Relación con el RPB-ANIP NAM/CAR	Responsable	Estado de Implantación*	Fecha entrega	Comentarios
Implement PBN Airspace Redesign Project for CAR Region	RPO 1	States, Territories, International Organizations / Estados, Territorios, Organizaciones Internacionales		Dec - 2018 (new date / nueva fecha)	<p>-Up-to-date the regional PBN Airspace concept</p> <p>-States to develop and implement a PBN Airspace Redesign Project for oceanic, continental and terminal areas in accordance with the ICAO Doc 9613 and Doc 9992, as needed /</p> <p>Mitigating measures: approved MCAAP project to address this deliverable</p> <p>-Actualizar el Concepto de Espacio Aéreo PBN regional</p> <p>-Los Estados implementan un Proyecto de Rediseño de Espacio Aéreo acorde a los Doc 9613 y 9992 de la OACI, según sea necesario.</p> <p>Acciones de mitigación: Proyecto MCAAP aprobado para atender este entregable</p>
Optimize the ATS route structure in the upper continental and oceanic airspace. / Optimizar la estructura de rutas ATS en el espacio aéreo superior continental y oceánico	RPO 1	States, Territories, International Organizations / Estados, Territorios, Organizaciones Internacionales		Dec 2016 Completed / Completado	<p>RNAV 5 Routes implemented in the upper airspace.</p> <p>On-going revision of 8 ATS routes / States to send proposals to ICAO NACC Regional Office by 30 June 2016</p> <p>Rutas RNAV 5 implantadas en el espacio aéreo superior.</p> <p>Revisión de 8 rutas ATS en progreso</p> <p>Los Estados enviarán sus propuestas a la Oficina Regional NACC de la OACI a más tardar el 30 de junio de 2016</p>
Implement SIDs/STARS, CDO	RPO 1	States, Territories,		Propose a new date	On-going revision of TMAs

and CCO in terminal areas based on RNAV/1-2 and RNP1 navigation specifications. / Implementar SIDs/STARS, CDO y CCO en áreas terminales en base a especificaciones de navegación RNAV/1-2 y RNP1		International Organizations / Estados, Territorios, Organizaciones Internacionales		/ Proponer nueva fecha	- Revisión de las TMA en progreso
Design and implement PBN APV approach procedures in accordance with Assembly Resolution A37-11 (BARO-VNAV), / Diseñar e implementar procedimientos de aproximación PBN APV (BARO-VNAV) según la Resolución de la Asamblea A37-11	RPO 1	States, Territories, International Organizations / Estados, Territorios, Organizaciones Internacionales		Propose a new date / Proponer nueva fecha	-RNP approach procedures implemented that represent 85.4% of the global target/ -Procedimientos de aproximación RNP implementados que representan el 85.4% de la meta global.
Analysis of regional feasibility for SBAS (WAAS/SACSA) implementation. / Estudio de factibilidad regional de la implantación del SBAS (WAAS / SACCSA)	RPO 1	Alfredo Mondragón assisted by / asistido por SACCSA and/y WAAS		Completed / Finalizada	-Mexico is testing 5 WAAS stations for domestic use. WAAS requirements will be regionally reviewed in the medium term. -Feasibility of regional application, technical aspects, operational benefits, associated costs, for an SBAS (WAAS/SACSA) implementation. Implications for airborne equipment (new or avionics update) and other relevant aspects. / -México tiene a prueba 5 estaciones WAAS para uso nacional. Los requisitos WAAS serán regionalmente revisados en el mediano plazo. -Factibilidad de la aplicación regional, los aspectos técnicos, los beneficios operacionales, los costos asociados, de la implantación del SBAS (WAAS / SACCSA), así como las implicaciones para los equipos de a bordo (nuevas o actualización de aviónicas) y otros aspectos pertinentes

Practical guidance for the implementation of GBAS Systems/ Guía práctica para la implementación de sistemas GBAS.	RPO 1	ANI/WG		Propose a new date / Proponer nueva fecha	- Regional agreement to organize GNSS workshop in 2016 -Acuerdo regional para organizar un Taller GNSS en 2016
<b>Required Resources / Recursos necesarios</b>	CAR Regional PBN Airspace Redesign Project, which includes PBN technical assistance programme to States / Proyecto regional de Rediseño de Espacio Aéreo PBN CAR que incluye programa de asistencia técnica PBN a los Estados				

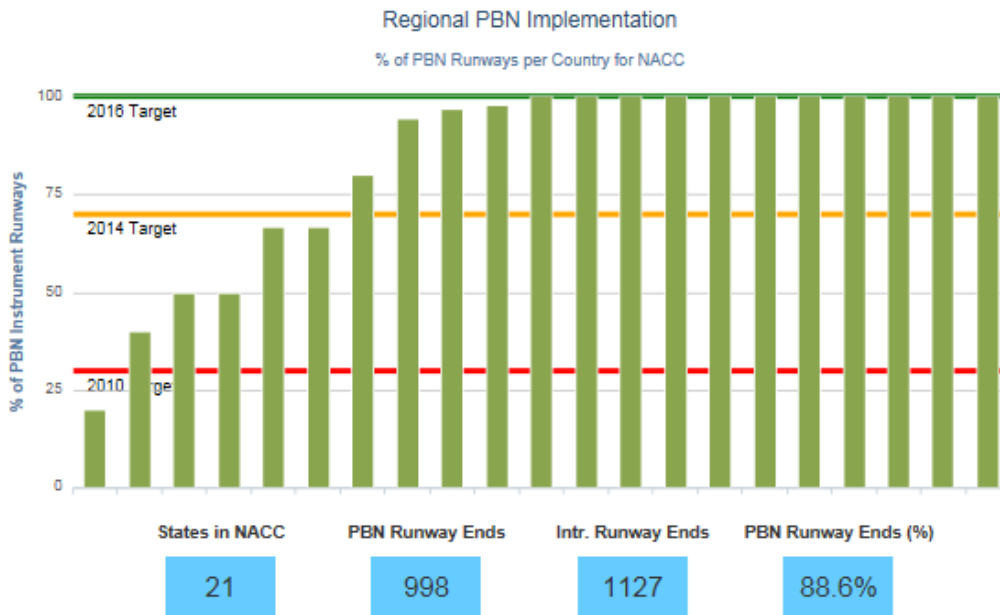
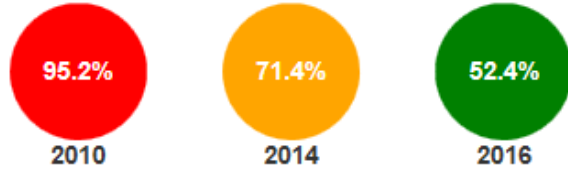
*Grey / Gris: Task not started / Tarea no iniciada;*

*Green / Verde: Activity underway as scheduled / Actividad en progreso de acuerdo con el cronograma;*

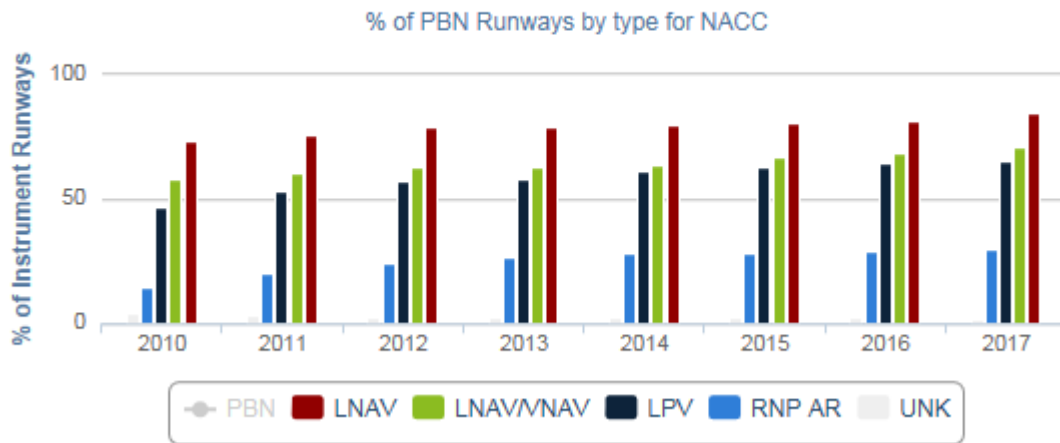
*Yellow / Amarillo: Activity started with some delay but expected to be complete don time / Actividad iniciada con cierto retardo pero estaría llegando a tiempo en su implantación;*

*Red / Rojo: It has not been posible to implement this activity as scheduled; mitigating measures are required / No se ha logrado la implantación de la actividad en el lapso de tiempo estimado se requiere adoptar medidas mitigatorias.*

85.4% **the Resolution Targets for Applicable Years**



### PBN Trends



## APPENDIX B

### PROJECT A1 FOR THE SAM REGION – PBN OPERATIONAL IMPLEMENTATION

<i>SAM Region</i>	PROJECT DESCRIPTION (PD)	PD N° A1	
<i>Programme</i>	Project Title	Start	End
<i>SAM airspace optimisation</i>  (Programme coordinator: ATM RO Fernando Hermoza Hübner)	PBN operational implementation  <i>Project coordinator:            Julio Cesar de Souza Pereira (IATA)</i>	2011	2019
<b>Objective</b>	Support the optimisation of the SAM airspace structure through the optimisation of the ATS route structure in terminal airspace (RNAV/RNP SIDs/STARs) and en-route (RNAV/RNP), as well as the implementation of PBN approaches in accordance with ICAO Assembly Resolution A37-11, with a view to attaining the goals set forth in the Declaration of Bogota.		
<b>Scope</b>	The implementation project contemplates the optimisation of the SAM airspace through PBN implementation and the application of the flexible use of airspace (FUA) concept, as well as phased optimisation of the ATS route network of the Region.		
<b>Metrics</b>	<ul style="list-style-type: none"> <li>• Reduction of CO<sub>2</sub> emissions per each route optimisation version, in tonnes.</li> <li>• Percentage of international airports with RNAV and/or RNP SIDs/STARs implemented.</li> <li>• Percentage of international airports with continuous descent and climb operations implemented.</li> <li>• Number of RNAV/RNP routes implemented, realigned and/or eliminated.</li> <li>• Percentage of thresholds with APV approaches at international airports.</li> </ul>		

<b>Strategy</b>	<p>Project activities will be coordinated among Project members, the Project coordinator and the Programme coordinator through SAM/IG meetings, ATS route optimisation (ATS/RO) meetings and other events deemed necessary (PBN workshops, hiring of experts, etc.). The Project coordinator will coordinate with the Programme coordinator the incorporation of additional experts if so required by the tasks and work to be performed. Likewise, States must review their respective national PBN implementation programmes to ensure they are compatible with the SAM PBN project. Activities to review, implement, modify or eliminate routes in the SAM Region have been scheduled in order to continue optimising the ATS route structure.</p>
<b>Goals</b>	<ul style="list-style-type: none"><li>• Implementation of Version 3 of the PBN-based ATS route network in order to respond to current airspace user requirements by the end of 2017.</li><li>• Achievement of the goals set forth in the Declaration of Bogota.</li><li>• PBN-based redesign of 30% of the main SAM TMAs by 2016, 50% by 2018.</li><li>• Development of Version 4 of the PBN-based ATS route network and design of PBN-based TMAs.</li><li>• Optimisation of longitudinal separation.</li></ul>

<p><b>Rationale</b></p>	<p>The 37<sup>th</sup> ICAO General Assembly formulated Resolution A37-11 (<i>Performance-based navigation global goals</i>) in which it took note that the Planning and Implementation Regional Groups (PIRG) had completed regional PBN implementation plans and urged States to implement RNAV and RNP air traffic service (ATS) routes and approach procedures in accordance with ICAO PBN concept laid down in the Performance-based navigation (PBN) manual (Doc 9613), and resolved that States should complete a PBN implementation plan as a matter of urgency to achieve:</p> <ol style="list-style-type: none"> <li>1) implementation of RNAV and RNP operations (where required) for en-route and terminal areas according to established timelines and intermediate milestones;</li> <li>2) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV-only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016, with intermediate milestones as follows: 30% by 2010 and 70% by 2014; and</li> <li>3) implementation of straight-in LNAV-only procedures, as an exception to 2) above, for instrument runways at aerodromes where there is no local altimeter setting available and where there are no aircraft suitably equipped for APV operations with a maximum certified take-off mass of 5 700 kg or more.</li> </ol> <p>Furthermore, the Global air navigation plan (GANP), Chapter 2 (implementation) defines performance-based navigation as its main priority. The GANP specifies that “<i>the introduction of PBN met the expectations of all the aviation community. Current implementation plans should help provide additional benefits, but they are still subject to the availability of proper training, the provision of specialised support by the States, continuing maintenance and development of international standards and recommended practices (SARPs) and closer coordination between States and aviation stakeholders.</i>”</p> <p>Accordingly, this project provides specialised support and close coordination between States and other stakeholders to ensure harmonised PBN implementation in all the corresponding flight phases: en-route, TMA and approach.</p>
<p><b>Related projects</b></p>	<ul style="list-style-type: none"> <li>• Flexible use of airspace</li> <li>• Automation</li> <li>• Air navigation systems in support of PBN</li> </ul>

Project deliverables	Relationship with the regional performance-based plan	Responsible party	Status of implementation*	Date of delivery	Comments
Implementation of Version 1 of the ATS route network based on RNAV, with the required PBN values to respond to the current requirements of airspace users.	B0-FRTO	Alexandre Luiz Dutra Bastos		October 2010 FINALISED	
Implementation of RNAV5 in the SAM Region	B0-FRTO	Alexandre Luiz Dutra Bastos		October 2011 FINALISED	
Action plan for the implementation of Version 2 of the ATS route network optimisation programme	B0-FRTO	Alexandre Luiz Dutra Bastos		ATSRO/3 FINALISED	

Traffic data to understand airspace traffic flows	B0-FRTO	ICAO coordinator		SAM/IG/6 FINALISED	
Navigation capacity of the fleet	PFF SAM ATM 01	Alexandre Luiz Dutra Bastos		SAM/IG/9 FINALISED	
List of gateways of the main SAM TMAs	PFF SAM ATM 02	Alexandre Luiz Dutra Bastos		SAM/IG/9	Assistance was provided to States for the redesign of their TMAs in order to expedite PBN implementation, by training their experts in airspace planning. Several States are delayed in their projects.
Letters of agreement and contingency with adjacent States	PFF SAM ATM 01	Alexandre Luiz Dutra Bastos		SAM/IG/10 FINALISED	
Detailed study of the SAM ATS route network with a view to developing Version 2 of the route network	B0-FRTO	Alexandre Luiz Dutra Bastos		April 2012 FINALISED	
Risk analysis for the implementation of Version 2 of the ATSRO programme	B0-FRTO	External consultants		SAM/IG/10 FINALISED	
<b><u>SAM Route Network Optimisation</u></b>					
Planning of Version 3 - Stage 1	B0-FRTO	External consultants		SAM/IG/14 FINALISED	

Implementation Version 3 - Stage 1 - Flow 1 (Argentina -Chile - Paraguay)	B0-FRTO	States SAM Regional Office		April 2015 FINALISED	
Implementation Version 3 - Stage 1 - Flow 2 (Argentina –Brazil - Uruguay)	B0-FRTO	States SAM Regional Office		March 2017 FINALISED	The optimisation of this traffic flow is delayed.
Implementation Version 3 - Stage 1 - Flow 3 (Panama - CENAMER - Caribbean)	B0-FRTO	States SAM Regional Office		March 2017 FINALISED	Coordination started with CAR States. The optimisation of this traffic flow is delayed. Panama will start the TMA and FIR airspace optimisation process. Improvements between Panama – Jamaica were coordinated at ATSRO/8.
Implementation Version 3 - Stage 1 - Flow 3 (Brazil -Guyana – French Guiana - Suriname - Venezuela - Caribe)	B0-FRTO	States SAM Regional Office		October 2016 FINALISED	The optimisation of the main flows has been coordinated.
Airspace concept Version 3 – Stage 2	B0-FRTO	States SAM Regional Office		ATSRO/7 FINALISED	The validated PBN airspace concept of the main SAM TMAs was agreed upon
Implementation Version 3 – Stage 2	B0-FRTO	States SAM Regional Office		November 2017 FINALISED	In October 2016. Routes not directly related to TMA re-structuring were implemented. The remaining initiatives were transferred to Version 4.

Development of the PBN route structure operational concept (ATS routes, SIDs, STARs) for the period 2017-2019	B0-FRTO	States SAM Regional Office		November 2016 FINALISED	Hiring of experts and invitation to States to contribute with human resources. The CONOPS has been presented at the SAM/IG/19 and ATSRO/8 meetings
Regional strategy and work programme for the implementation of the flexible use of airspace through a phased approach, starting with an increasingly dynamic sharing of reserved airspace.	B0-FRTO	States SAM Regional Office		2013-2018	The flexible use of airspace is being enhanced through route optimisation.
Reduction of conventional longitudinal separation from 80 to 40 NM for GNSS-equipped aircraft.	B0-FRTO	States SAM Regional Office		2016-2017	Significant progress has been made in this task, which is expected for completion on time. Some States like Venezuela depend on action taken by adjacent CAR States. A regional workshop was held in November 2017, where activities were designed to consolidate implementation.
Reduction of conventional longitudinal separation from 40 to 20 NM for GNSS-equipped aircraft.	B0-FRTO	States SAM Regional Office		2017-2019	A proposal of Action Plan for the implementation of 20-NM separation minima was agreed at the regional workshop held in November 2017. Brazil started applying this minimum ONLY for aircraft ENTERING its FIRs, on continental airspace.
Reduction of conventional longitudinal separation from 20 to 10 NM for scenarios in which ATS surveillance systems are used that cover the boundaries of the FIRs under consideration.	B0-FRTO	States SAM Regional Office		2019 2020 - 2021	

<b><u>PBN TMA</u></b>					
Updating of action plans. PBN implementation in the main TMAs	PFF SAM ATM 02	States		May 2017 FINALISED	Conclusion SAM/IG/14-6. 100% of States have updated their action plans.
Updating of the status of implementation of PBN SIDs/STARs	PFF SAM ATM 02	States		September 2017	Yearly update prior to 30 June and prior to 31 December, in accordance with Conclusion SAM/IG/14-4. Tables were updated at the ATSRO/08 meeting. No information is available for French Guiana.
Updating of Table AOP-1	PFF SAM ATM 02	States		TBD	Conclusion SAM/IG/15-3.
<b><u>Approach</u></b>					
Updating of the status of implementation of APV IAC	PFF SAM ATM 03 B0 APTA	States		30 June 2019	Yearly update prior to 30 June and prior to 31 December, in accordance with Conclusion SAM/IG/14-4. Implementation of RNP APCH procedures with Baro-VNAV vertical guidance or RNP AR APCH must be reported. Tables were updated at the ATSRO/8 meeting. No information is available for French Guiana.

<b><u>Meetings/Workshops</u></b>					
SAM/IG/07	PFF SAM ATM	States SAM Regional Office		May 2011 FINALISED	SAM PBN implementation group
SAM/IG/08	PFF SAM ATM	States SAM Regional Office		October 2011 FINALISED	SAM PBN implementation group
SAM/IG/09	PFF SAM ATM	States SAM Regional Office		Mayo 2012 FINALISED	SAM PBN implementation group
SAM/IG/10	PFF SAM ATM	States SAM Regional Office		October 2012 FINALISED	SAM PBN implementation group
SAM/IG/11	PFF SAM ATM	States SAM Regional Office		May 2013 FINALISED	SAM PBN implementation group
SAM/IG/12	PFF SAM ATM	States SAM Regional Office		October 2013 FINALISED	SAM PBN implementation group
SAM/IG/13	PFF SAM ATM	States SAM Regional Office		Mayo 2014 FINALISED	SAM PBN implementation group
SAM/IG/14	PFF SAM ATM	States SAM Regional Office		October 2014 FINALISED	SAM PBN implementation group

SAM/IG/15	PFF SAM ATM	States SAM Regional Office		May 2015 FINALISED	SAM PBN implementation group
SAM/IG/16	PFF SAM ATM	States SAM Regional Office		October 2015 FINALISED	SAM PBN implementation group
SAM/IG/17	PFF SAM ATM	States SAM Regional Office		May 2016 FINALISED	SAM PBN implementation group
SAM/IG/18	PFF SAM ATM	States SAM Regional Office		October 2016 FINALISED	SAM PBN implementation group
SAM/IG/19	PFF SAM ATM	States SAM Regional Office		May 2017 FINALISED	SAM PBN implementation group
ATSRO/03	PFF SAM ATM 03	States SAM Regional Office		July 2011 FINALISED	SAM route network optimisation
ATSRO/04	PFF SAM ATM 03	States SAM Regional Office		July 2012 FINALISED	SAM route network optimisation
ATSRO/05	PFF SAM ATM 03	States SAM Regional Office		July 2013 FINALISED	SAM route network optimisation
ATSRO/06	PFF SAM ATM 03	States SAM Regional Office		October 2014 FINALISED	SAM route network optimisation

ATSRO/07	PFF SAM ATM 03	States SAM Regional Office		October 2015 FINALISED	SAM route network optimisation
ATSRO/08	PFF SAM ATM 03	States SAM Regional Office		September 2017 FINALISED	- Held on 11-15 September 2017. Implementation of Version 4 of the route network was begun.
ATSRO/09	PFF SAM ATM 03	States SAM Regional Office		July 2018	SAM route network optimisation
Hiring of experts for consolidation of Version 4 of the SAM ATS route network	PFF SAM ATM 03	States SAM Regional Office		June 2017 FINALISED	- Two experts from the Region were hired. The Route Network Version 4 deliverable was developed with 91 route improvement initiatives.
Hiring of experts for consolidation of Version 5 of the SAM ATS route network	PFF SAM ATM 03	States SAM Regional Office		September 2018	SAM route network optimisation
Workshop on PBN airspace planning	B0 APTA B0 CCO B0 CDO	States SAM Regional Office		March 2013 FINALISED	Initial training in the PBN airspace planning process.
PBN/1 workshop	B0 APTA B0 CCO B0 CDO	States SAM Regional Office		May 2014 FINALISED	Objective: Preliminary PBN training and design of the Asunción and Bogota TMAs.
PBN/2 workshop	B0 APTA B0 CCO B0 CDO	States SAM Regional Office		September 2014 FINALISED	Objective: Preliminary PBN design of the main South American TMAs.
PBN/3 workshop	B0 APTA B0 CCO B0 CDO	States SAM Regional Office		March 2015 FINALISED	Objective: Validation of the preliminary PBN design of the main South American TMAs.

PBN/4 workshop	B0 APTA B0 CCO B0 CDO	States SAM Regional Office		September 2015 FINALISED	Objective: Guide PBN implementation at the main South American TMAs.
PBN/IMP/1 workshop	B0 APTA B0 CCO B0 CDO	States SAM Regional Office		April 2016 FINALISED	Review the status of implementation in States whose implementation date was the first semester of 2016.
PBN/IMP/2 workshop and related PANS-OPS activities	B0 APTA B0 CCO B0 CDO	States SAM Regional Office		September 2016 FINALISED	Review the status of implementation in States whose implementation date is the second half of 2016 and carry out the related PANS-OPS activities.
<b><u>Others</u></b>					
Updating and submission of the National PBN implementation plan to the Regional Office	B0 APTA B0 CCO B0 CDO	States		SAM/IG/15	93% of States have completed the task. French Guiana is still pending. Headquarters has requested the delivery of the national PBN implementation plans.
<b>Resources needed</b>	Designation of experts for completion of some of the deliverables.				

\*

**Grey*****Task not started yet*****Green*****Activity being implemented as scheduled*****Yellow*****Activity started with some delay, but will be implemented on time*****Red*****Activity not implemented on time; mitigation measures are required***

## APPENDIX C

## PROJECT A2 – AIR NAVIGATION SYSTEMS IN SUPPORT OF PBN

SAM Region	PROJECT DESCRIPTION (DP)	DP N° A2	
<i>Programme</i>	Project Title	Start	End
PBN  (Programme coordinator: ATM RO Fernando Hermoza)	Air navigation systems in support of PBN  <i>Project coordinator:</i> <i>Julio César de Souza Pereira Pereira (IATA)</i>  <i>Experts contributing to the Project: Alessander Santoro, Andre Jansen, Fabio Augusto Andrade (Brazil), Paulo Vila, Tomas Macedo (Peru) and SAM/IG SAM PBN Group</i>	January 2011	December  2018
<b>Objective</b>	Develop guides, conduct analyses and implement services in support of PBN implementation in the SAM Region.		
<b>Scope</b>	Support to PBN implementation in the SAM Region, initially consisting of: <ul style="list-style-type: none"> <li>• Practical guide for the implementation of GBAS systems.</li> <li>• Analysis of DME/DME coverage to support PBN procedures.</li> <li>• Implementation of a RAIM availability prediction service.</li> </ul>		
<b>Metrics</b>	<ul style="list-style-type: none"> <li>• Drafting of a practical guide for the implementation of a GBAS system.</li> <li>• DME/DME coverage in the SAM Region.</li> <li>• Availability of a RAIM availability prediction service.</li> <li>• % States providing the RAIM availability service.</li> </ul>		
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• All activities will be conducted by experts designated by SAM States and organisations participating in the project entitled “Air navigation systems in support of PBN”, under the management of the project coordinator and the supervision of the programme coordinator. Communications among project members, and between the project coordinator and the programme coordinator shall be done through teleconferences and the Internet. Likewise, the programme coordinator, the project coordinator and the contributing experts can meet at the SAM/IG implementation meetings.</li> <li>• Once the studies have been completed, the results will be sent to the ICAO programme coordinator as a final consolidated document, and to the GREPECAS PPRC for analysis, review and approval.</li> </ul>		

<b>Goals</b>	<ul style="list-style-type: none"> <li>• Guide for the implementation of a GBAS system, by October 2012. (Revision November 2016).</li> <li>• Assessment of DME/DME coverage to support PBN procedures, by May 2011.</li> <li>• RAIM availability prediction service in the SAM Region implemented by September 2014.</li> <li>• 11 SAM States with RAIM availability prediction service available by February 2014.</li> <li>• 3 SAM States and one territory with the service available by the end of 2014.</li> </ul>
<b>Rationale</b>	<ul style="list-style-type: none"> <li>• The implementation of PBN procedures for approach, terminal and en-route operations requires the implementation of air navigation systems, services and infrastructure studies, such as the proper installation of DME to support the DME/DME navigation required in the event of failure of the GNSS system, the RAIM availability prediction service to enable the user to know what is RAIM availability for en-route, terminal and approach operations, and the implementation of GBAS systems to support precision landing procedures.</li> <li>• This project contributes to the implementation of SAM PFF CNS 03, ATM 01, ATM 02, and ATM 03 of the <i>SAM Performance-based navigation system implementation plan (SAM PBIP)</i>.</li> </ul>
<b>Related projects</b>	<ul style="list-style-type: none"> <li>• Implementation of PBN operational aspects.</li> </ul>

<b>Project deliverables</b>	<b>Relationship with the performance-based regional plan and ASBU block 0 modules</b>	<b>Responsible party</b>	<b>Status of implementation</b>	<b>Delivery date</b>	<b>Comments</b>
<i>Develop a practical guide for the implementation of the GBAS system</i>					
Review of practical guide for the implementation of GBAS systems	SAM PFF CNS 03 ANRF B0-APTA (65)	Alessander Santoro (Brazil)		December  2018	The practical guide for the implementation of GBAS systems was presented for review at SAM/IG/8 meeting. It was circulated to all States of the Region for review and final version was presented at SAM/IG/11 meeting. In order to measure the real impact, joint work was undertaken using the SLS-4000 station and other 110 GPS L1 and L2 stations installed in Brazil. Data was collected over a period of maximum solar activity, although it was the lowest in the

Project deliverables	Relationship with the performance-based regional plan and ASBU block 0 modules	Responsible party	Status of implementation	Delivery date	Comments
					<p>last 100 years.                      From the data obtained, Brazil concluded that so far, the SLS-4000 station may not be used in full for CAT I operations in low latitude regions. Accordingly, ICEA (<i>Instituto de Control del Espacio Aéreo</i>) will continue research in cooperation with the FAA and the supplier (Honeywell), seeking to develop a risk model capable of withstanding ionosphere behaviour in low latitudes.</p> <p>As of December 2017, the SLS-4000 station does not meet ICAO's integrity and availability requirements.</p> <p>Brazil continues research in collaboration with universities and Honeywell, seeking to develop a risk model applicable to the SAM Region.</p> <p>A review of the practical guide for the implementation of the GBAS system will follow after completing the development of a risk model capable of withstanding ionosphere behaviour at low latitudes.</p> <p>This is to be completed by the last quarter of 2018.</p>

Project deliverables	Relationship with the performance-based regional plan and ASBU block 0 modules	Responsible party	Status of implementation	Delivery date	Comments
<i>Analyse DME/DME and GNSS infrastructure and coverage needed to support PBN implementation</i>					
Analysis of the DME/DME and GNSS infrastructure required to support PBN implementation in the SAM Region	SAM PFF CNS/03 SAM PFF ATM/01 ATM/02 ATM/03 ANRF B0-APTA(65) B0-FRTO(10), B0-CDO(05) and B0-CCO(20)	Fabio Augusto Andrade and Andre Jansen (Brazil) Paulo Vila and Tomás Macedo (Peru)		Coverage study to support RNAV-5 completed (SAM/IG/8, October 2011)	A <i>DME/DME coverage study</i> was presented and reviewed at the SAM/IG/7 meeting (Lima, Peru, 23-27 May 2011). The coverage study was conducted using the EMACS tool and the results were delivered in a KMZ file clearly showing DME/DME coverage over the geographical map of the SAM Region, using <i>Google Earth</i> . The study only supports the RNAV-5 procedure.
<i>Development of guidance on the use and availability of GNSS performance forecast/validation tools.</i>					

Project deliverables	Relationship with the performance-based regional plan and ASBU block 0 modules	Responsible party	Status of implementation	Delivery date	Comments
Implementation of a RAIM availability prediction service	SAMPFF CNS/03 SAM PFF ATM/01 ATM/02 ATM/03 ANRF B0-APTA (65), B0-FRTO(10) B0-CDO(05) and B0-CCO(20)	Project coordinator SAM/IG PBN Group		November 2014	<p>Two web-based remote courses were conducted on 15 and 16 September 2014, one in English and the other in Spanish, mainly including explanation of the tools contained in the SAM RAIM availability prediction service website (SATDIS), the code assignment procedure, data import and export, and the query and failure resolution procedure. The course was attended by all focal points nominated by the States, as well as by other participants designated by the States.</p> <p>All focal points received from the service provider the respective user name and password to access SATDIS as administrators.</p> <p>The SATDIS website in three languages (Spanish, Portuguese and English), became operational on 17 September 2014.</p> <p>The SATDIS FSAT was conducted on 18 November 2014.</p> <p>The RAIM availability prediction service is operating since 16 November 2014.</p>

Project deliverables	Relationship with the performance-based regional plan and ASBU block 0 modules	Responsible party	Status of implementation	Delivery date	Comments
Monitor activities for the implementation of air navigation systems in support of PBN		ICAO		January 2011 - December 2018	
Resources needed	Implementation of the RAIM availability prediction service.				

**Grey** – Task not started

**Green** – Activity underway as scheduled

**Yellow** – Activity started with some delay but expected to be completed on time

**Red** – I has not been possible to implement this activity as scheduled; mitigating measures are required

## APPENDIX D / APÉNDICE D

**IMPROVE DEMAND AND CAPACITY BALANCING (DCB) /  
MEJORAR EL EQUILIBRIO ENTRE LA DEMANDA Y LA CAPACIDAD (DCB)**

<i>CAR Region / Región CAR</i>	<b>PROJECT DESCRIPTION / DESCRIPCION DEL PROYECTO (DP)</b>	<b>DP N° B1</b>	
<i>Programme / Programa</i>	<b>Title of the Project / Título del Proyecto</b>	<b>Start / Fecha inicio</b>	<b>End / Fecha término</b>
<i>Improve demand and capacity balancing (DCB) / Mejorar el equilibrio entre demanda y capacidad (DCB) (Programme Coordinator / Coordinador del Programa: Eddian Méndez)</i>	<p align="center"><i>Improve demand and capacity balancing (DCB) / Mejorar el equilibrio entre demanda y capacidad (DCB)</i></p> <p align="center">Project Coordinator / Coordinador del Proyecto: Greg Byus (United States / Estados Unidos) Agustin Rolon (México) Julio Mejia (Dominican Republic / República Dominicana) Fernando Soto (COCESNA)</p>	2008	2018
<b>Objective / Objetivo</b>	Support the ATFM implementation based on the regional performance objectives of the Performance-based Air Navigation Implementation Plan for NAM/CAR Regions (RPBANIP NAM/CAR). / Apoyar la implementación ATFM con base en los objetivos regionales de performance del Plan de Implementación basada en la Performance para las Regiones NAM/CAR (RPBANIP NAM/CAR).		
<b>Scope / Alcance</b>	Progressive implementation of the ATFM service in CAR Region to ensure demand and capacity balancing (DCB). / Implantación progresiva del servicio ATFM en la Región CAR para asegurar un equilibrio entre demanda y capacidad (DCB).		
<b>Metrics / Métricas</b>	<ul style="list-style-type: none"> <li>• % of States with coordination ATFM procedures implemented / % de Estados con procedimientos de coordinación ATFM implementados.</li> <li>• % of States with Flow Management Unit (FMU) or Flow Management Position (FMP) implemented. / % de Estados con dependencias de Organización de la afluencia (FMU) o puestos de gestión de la afluencia (FMP) implementadas.</li> </ul>		

<p><b>Strategy / Estrategia</b></p>	<p>The implementation activities will be coordinated between Project members, the Project Coordinator and the Programme Coordinator. The Programme Coordinator will coordinate with the Project Coordinator requirements of other projects and NAM/CAR implementation working groups. Experts nominated by States, Territories and International Organizations will be incorporated, as required. / La ejecución de las actividades será coordinada entre miembros del Proyecto, el Coordinador del Proyecto y el Coordinador del Programa. El coordinador del Programa coordinará con el Coordinador del Proyecto los requerimientos de otros proyectos y Grupos de Trabajo de Implementación NAM/CAR. Se incorporarán expertos nominados por los Estados, Territorios y Organizaciones Internacional, según sea requerido.</p>
<p><b>Targets / Metas</b></p>	<ul style="list-style-type: none"> <li>• 60% of CAR States with ATFM units or Flow Management Position by December 2014. /on-going 60% de Estados de la Región CAR con unidades ATFM o puestos de gestión de afluencia implementados en Diciembre de 2014 /En progreso</li> <li>• 90% of CAR States with ATFM procedures implemented by December 2016. / on-going 90% de Estados de la región CAR con procedimientos ATFM implementados en Diciembre de 2016 / En progreso</li> </ul>
<p><b>Justification / Justificación</b></p>	<p>GREPECAS supported the ATFM implementation to ensure an optimum traffic flow when demand exceeds or is expected to exceed the available capacity of the ATS system. / El GREPECAS apoyó la implantación de la ATFM para garantizar una afluencia óptima de tránsito aéreo durante períodos en los cuales la demanda excede o se espera exceda la capacidad disponible del sistema ATS.</p>
<p><b>Related Projects / Proyectos relacionados</b></p>	<ul style="list-style-type: none"> <li>• PBN Implementation. / Implementar la Navegación Basada en la Performance (PBN).</li> <li>• Flexible use of airspace. Uso flexible del espacio aéreo.</li> <li>• Improve ATM Situational Awareness. / Mejorar la Conciencia Situacional ATM.</li> </ul>

Project deliverables / Resultados entregables del Proyecto	Relationship with RPB- ANIP NAM/CAR / Relación con el RPB-ANIP NAM/CAR	Responsible / Responsable	Status of implementation / Estado de Implantación*	Delivery date / Fecha entrega	Remarks / Comentarios
<p>Define common elements of ATM situational awareness between FMUs;</p> <ul style="list-style-type: none"> <li>▪ common traffic displays,</li> <li>▪ common weather displays (Internet),</li> <li>▪ communications (teleconferences, web), and</li> <li>▪ regular teleconference /messages methodology advisories</li> </ul> <p>/Definir los elementos comunes de conciencia situacional ATM;</p> <ul style="list-style-type: none"> <li>▪ visualización común de tránsito,</li> <li>▪ visualización común de condiciones meteorológicas (Internet),</li> <li>▪ comunicaciones (conferencias telefónicas, web), y</li> <li>▪ metodología de asesorías regulares mediante conferencias telefónicas</li> </ul>	RPOs 1, 2, 3, 9	States, Territories, International Organizations / Estados, Territorios, Organizaciones Internacionales		<p>Dec <del>2016</del></p> <p>Propose a new date / Proponer nueva fecha</p>	<p>Regional teleconferences are carried out on weekly basis through agreed methodology. Additional situational awareness requirements will be defined in the short term. / Se llevan a cabo teleconferencias regionales semanalmente con la metodología acordada. Requisitos adicionales de conciencia situacional ATM serán definidos en el corto plazo.</p>

Develop an ATFM proposal for amendment (PFA) to regional supplementary procedures (Doc 7030) . / Desarrollar una propuesta de enmienda (PFA) a los procedimientos suplementarios regionales (Doc 7030)	RPOs 2, 3	States, Territories, International Organizations / Estados, Territorios, Organizaciones Internacionales		Dec 2018 New date proposed / Nueva fecha propuesta	On-going / En progreso
Develop operational agreements between ATFM units for interregional demand/capacity balancing. / Desarrollar acuerdos operacionales entre unidades ATFM para equilibrar la demanda/capacidad interregional.	RPOs 3	States, Territories, International Organizations / Estados, Territorios, Organizaciones Internacionales		Dec2018 New date proposed / Nueva fecha propuesta	Develop a model of ATFM LOAs based on the ICAO Doc 9971 that includes a Model of ATFM LOA. / Desarrollar un modelo de LOA basado en el Doc 9971 de la OACI que incluya un modelo de LOA ATFM.
<b>Required Resources / Recursos necesarios</b>	CAR Regional Project with the participation of States to support ATFM training aspects. / Proyecto regional CAR con la participación de los Estados para apoyar los asuntos de instrucción ATFM.				

*Grey / Gris:*

*Task not started / Tarea no iniciada;*

*Green / Verde:*

*Activity underway as scheduled / Actividad en progreso de acuerdo con el cronograma;*

*Yellow / Amarillo:*

*Activity started with some delay but expected to be complete don time / Actividad iniciada con cierto retardo pero estaría llegando a tiempo en su implantación;*

*Red / Rojo:*

*It has not been posible to implement this activity as scheduled; mitigating measures are required / No se ha logrado la implantación de la actividad en el lapso de tiempo estimado se requiere adoptar medidas mitigatorias.*

**IMPLEMENTATION OF FLEXIBLE USE OF AIRSPACE (FUA)  
/IMPLEMENTACIÓN DEL USO FLEXIBLE DEL ESPACIO AÉREO (FUA)**

<i>CAR Region / Región CAR</i>	<b>PROJECT DESCRIPTION / DESCRIPCION DEL PROYECTO (DP)</b>	<b>DP N° B2</b>	
<i>Programme Programa</i>	<b>Title of the Project / Título del Proyecto</b>	<b>Start / Fecha inicio</b>	<b>End / Fecha término</b>
<i>Implementation of flexible use of airspace (FUA) / Implementación del uso flexible del espacio aéreo (FUA) (Programme Coordinator Coordinador del Programa: Eddian Méendez)</i>	<p align="center"><i>Implementation of flexible use of airspace (FUA) / Implementación del uso flexible del espacio aéreo (FUA)</i></p> <p align="center">Project Coordinator / Coordinador del Proyecto: Greg Byus (United States / Estados Unidos) Agustin Rolon (México) Julio Mejia (Dominican Republic / República Dominicana) Fernando Soto (COCESNA)</p>	2008	2016
<b>Objective / Objetivo</b>	Support the implementation for the optimization, balance and equity in the use of airspace between different users and achieve a better civil/military coordination and cooperation, reinforcing air safety based on regional performance objectives of the Performance based Implementation Plan for NAM/CAR Regions (NAM/CAR RPBANIP) / Apoyar la implementación para la optimización, el equilibrio y la equidad en el uso del espacio aéreo entre los diferentes usuarios y lograr una mejor coordinación y cooperación civil/militar reforzando la seguridad operacional, en base a los objetivos regionales de performance del Plan de Implementación basada en la Performance para las Regiones NAM/CAR (RPBANIP NAM/CAR)		
<b>Scope / Alcance</b>	Development of guides for the implementation of flexible use of airspace (FUA) / Elaboración de guías para la implantación del Uso flexible del espacio aéreo (FUA)		
<b>Metrics / Métricas</b>	<ul style="list-style-type: none"> <li>• % of States with civil/military coordination Committees / % de Estados con Comités de Coordinación Civil/Militar</li> <li>• % of reduction in number of permanent reserved airspace / % de reducción del número de espacios aéreos reservados de carácter permanente</li> <li>• Reduction in number of permanent reserved airspace / Reducción del número de espacios aéreos reservados de carácter permanente</li> </ul>		
<b>Strategy / Estrategia</b>	The implementation of activities will be coordinated between members of the Project, the Project Coordinator and the Programme Coordinator. The Programme Coordinator will coordinate with the project coordinator the requirements of other projects and NAM/CAR implementation working groups. Experts nominated by States, Territories and International Organizations will be incorporated to develop tasks as required / La ejecución de las actividades será coordinada entre miembros del Proyecto, el Coordinador del Proyecto y el Coordinador del Programa. El Coordinador del Programa coordinará con el Coordinador del Proyecto los requerimientos de otros proyectos y Grupos de Trabajo de Implementación NAM/CAR. Se incorporarán expertos nominados por los Estados, Territorios y Organizaciones Internacionales para desarrollar las tareas, según se requiera		

<b>Goals / Metas</b>	<ul style="list-style-type: none"> <li>80% of CAR Region States having implemented civil/military Coordination Committees for the flexible use of airspace (FUA) /Completed</li> <li>80% de los Estados de la Región CAR con Comités de Coordinación Civil/Militar implantados para el Uso flexible del espacio aéreo (FUA) /Completado</li> </ul>
<b>Justification / Justificación</b>	GREPECAS supported the implementation of flexible use of airspace (FUA) for the optimization of ATS airspace and air traffic flow management (ATFM) efficiency / El GREPECAS apoyó la implantación del uso flexible del espacio aéreo (FUA) para optimizar la eficiencia del espacio aéreo ATS y la gestión de la afluencia del tránsito aéreo (ATFM).
<b>Related Projects / Proyectos relacionados</b>	<ul style="list-style-type: none"> <li>Implement PBN / Implementar la PBN</li> <li>Improve balance between demand and capacity / Mejorar el equilibrio entre la demanda y capacidad</li> <li>Improve ATM situational awareness / Mejorar la Conciencia Situacional ATM</li> </ul>

<b>Project deliverables / Entregables del Proyecto</b>	<b>Relationship with RPB-ANIP / Relación con el RPB-ANIP NAM/CAR</b>	<b>Responsible / Responsable</b>	<b>Status of implementation / Estado de Implantación*</b>	<b>Delivery date / Fecha entrega</b>	<b>Remarks / Comentarios</b>
Conduct a regional review of special use of airspace / Llevar a cabo una revisión regional del espacio aéreo de uso especial.	RPOs 1, 2, 3	PBN TF		Dec 2018 New date proposed / Nueva fecha propuesta	Revision of the special use of airspace will be carried out in 2018 / La revisión del espacio aéreo de uso especial se llevara a cabo en 2018
<b>Required Resources / Recursos necesarios</b>	CAR Regional Project with the participation of States to support civil-military coordination for the flexible use of airspace (FUA) / Proyecto regional CAR con la participación de los Estados para apoyar la coordinación civil-militar para el uso flexible del espacio aéreo (FUA)				

*Grey / Gris:*

*Task not started / Tarea no iniciada;*

*Green / Verde:*

*Activity underway as scheduled / Actividad en progreso de acuerdo con el cronograma;*

*Yellow / Amarillo:*

*Activity started with some delay but expected to be completed on time / Actividad iniciada con cierto retardo pero estaría llegando a tiempo en su implantación;*

*Red / Rojo:*

*It has not been posible to implement this activity as scheduled; mitigating measures are required / No se ha logrado la implantación de la actividad en el lapso de tiempo estimado se requiere adoptar medidas mitigatorias.*

## APPENDIX E

## PROJECT B1 – IMPROVE DEMAND-CAPACITY BALANCING

<i>SAM Region</i>	PROJECT DESCRIPTION (DP)	DP N° B1	
<i>Programme</i>	Project Title	Start	End
<i>Air traffic flow management (ATFM)</i>  <i>(Programme coordinator: ATM RO Fernando Hermoza Hubner)</i>	<i>Improve demand-capacity balancing</i>  <i>Project coordinator: Martha Soto Ansaldi (Peru)</i>	2012	<del>2016</del> 2019
<b>Objective</b>	Avoid overloading the ATC and airport systems, strengthening safety, taking into consideration the reduction in the number of delays caused by meteorological and traffic conditions, thus reducing fuel consumption and contaminating emissions. Likewise, improve prediction and management of surplus demand for services in ATC sectors and aerodromes.		
<b>Scope</b>	The scope of this project establishes that ATFM implementation should start with airport and airspace monitoring in order to identify significant increases in ground delays and in-flight holding, as well as bottlenecks (ATC sector, runway, apron, and airport facilities). Furthermore, capacity calculation and air traffic demand analysis are important elements to improve demand/capacity balancing.		
<b>Metrics</b>	<ul style="list-style-type: none"> <li>• % States that have calculated runway and ATC sector capacity</li> <li>• % States that have implemented ATFM in flow management units (FMUs) or flow management positions (FMPs)</li> </ul>		

<b>Strategy</b>	Project activities define ATFM implementation in the SAM Region through an airspace demand and capacity analysis, taking into account that States that are in the process of implementation shall coordinate with the ATM community to define the actions required for ATFM implementation. The infrastructure and the database, as well as the policy, standards, and procedures, are important components for the execution of this Project.
<b>Goals</b>	<ul style="list-style-type: none"><li>• SAM States with experts trained in runway and airspace capacity (ATC sector) calculation</li><li>• ATFM performance oversight plan</li><li>• CAR/SAM inter-regional coordination</li></ul>
<b>Rationale</b>	GREPECAS considered that early ATFM implementation should ensure optimum air traffic flow to or through certain areas during periods in which demand exceeded or was expected to exceed the available capacity of the ATC system. Therefore, the ATFM system should reduce aircraft delays, both in flight as well as on the ground, and avoid system overload.
<b>Related projects</b>	<ul style="list-style-type: none"><li>• Automation.</li></ul>

Project deliverables	Relationship with the performance-based regional plan (PFF)	Responsible party	Status of implementation*	Delivery date	Comments
Assess the progress made in the ATFM implementation work programme	B0-NOPS	Programme coordinator		2016	On-going task
Calculation of airspace (ATC sector) capacity	B0-NOPS	Juarez Franklin Gouveia		SAM/IG/9	Brazil and Colombia submitted their studies.
List of airspace sectors that have periods in which demand exceeds the existing capacity, including, if necessary, simulations by the States	B0-NOPS	Juarez Franklin Gouveia		SAM/IG/9 SAM/IG/10	Brazil and Colombia submitted their studies.
List of operational factors affecting demand and airspace capacity for the optimisation of existing capacity, including simulations, if necessary.	B0-NOPS	Juarez Franklin Gouveia		SAM/IG/9	Brazil and Colombia submitted their studies. Brazil, Paraguay, and Peru presented data at the SAM/IG/11 meeting.
Definition of the common elements of situational awareness	B0-NOPS	Paulo Vila		2012	The States that exchange information are: Chile, Colombia, Paraguay, and Venezuela.

Training of personnel in strategic ATFM airspace measures	B0-NOPS	Project RLA/06/901		2010 2019	<p>In 2010, an ATFM/CDM course was conducted in Brazil with the participation of several States.</p> <p>In March 2009, a course on runway and ATC sector capacity calculation was conducted in Brazil.</p> <p>In 2012, a course for instructors on runway and ATC sector capacity calculations was conducted in Lima.</p> <p>An ATFM seminar has been scheduled for June 2018 to address the proper implementation of ATFM measures.</p>
List of factors affecting the implementation decision	B0-NOPS	Programme coordinator		2010	<p>The following causes were identified at the SAM/IG/11 meeting:</p> <ul style="list-style-type: none"> <li>- States that do not have the requirement or the need to implement ATFM;</li> <li>- Budgetary and organisational reasons;</li> <li>- Lack of personnel specifically devoted to ATFM activities;</li> <li>- The personnel responsible for ATFM are involved in other functions.</li> </ul>
Updating of runway capacity calculations	B0-NOPS	Programme coordinator		November 2015 2019	85% of States have updated runway capacity calculations. Guyana and Suriname are still lacking capacity calculations.
Updating of airspace (ATC sector) capacity calculations	B0-NOPS	Programme coordinator		November 2015 2019	6 States of the Region have performed ATC sector capacity calculations prior to implementation, 5 have not performed the activity, and information is still to be received from 3 States.

Airspace monitoring processes Traffic demand analysis processes Standards on FMU/FMP procedures Implementation of preliminary ATFM measures Implementation of TMIs ATFM messaging Coordination of special events Civil/military exemptions and coordination	B0-NOPS	CGNA course Project RLA/06/901		November 2014 FINALISED	Completed on time
Replication of ATFM courses at national level	B0-NOPS	States		15/05/2015 FINALISED	The States replicated ATFM courses at national level.
ATFM measures during the Rio 2016 Olympic and Paralympic Games in Brazil	B0-NOPS	Brazil		13/05/2016 FINALISED	Details of the AIC of Brazil can be found in: <a href="http://publicacoes.decea.gov.br/?i=publicacao&amp;id=4339">http://publicacoes.decea.gov.br/?i=publicacao&amp;id=4339</a>
Status of implementation of ATFM	B0-NOPS	Programme coordinator		31/10/2016	By December 2017, 63% of the States had implemented ATFM.
<b>Resources needed</b>	Designation of experts for the execution of some of the deliverables.				

\*

<b>Grey</b>	<b>Task not started</b>
<b>Green</b>	<b>Activity underway as scheduled</b>
<b>Yellow</b>	<b>Activity started with some delay but expected to be completed on time</b>
<b>Red</b>	<b>It has not been possible to implement this activity as scheduled; mitigation measures are required</b>

## APPENDIX F

## PROJECT ON AERODROME SAFETY AND CERTIFICATION – CAR REGION

CAR Region	PROJECT DESCRIPTION (PD)	PD N° F1	
<i>Programme</i>	Project Title	Start	End
<i>Aerodromes</i>  (Programme Coordinator: <i>Jaime Calderon</i> )	<i>Aerodrome Safety and Certification</i>  <i>Project Coordinator: TBD</i>	July 2017	July 2020
<b>Objective</b>	Assist States in the CAR Region to increase the number of certified aerodromes and the establishment of runway safety mechanisms (e.g. Runway Safety Teams) to tackle runway safety related events at selected aerodromes.		
<b>Scope</b>	The scope of the project includes the identification of latent problems or bottlenecks in the aerodrome certification process, in order to better assess States complying regional targets and develop tailored needs in relation to documentation, processes and procedures, development of guidelines, training, expert advice, best practices, and data and information collection, to enable initial certification of aerodromes and continuous surveillance.		
<b>Metrics</b>	<ul style="list-style-type: none"> <li>• Number of aerodromes certified per State</li> <li>• % of aerodromes certified per Region</li> <li>• Number of AGA inspectors per State</li> <li>• State EI % in the AGA area</li> <li>• Number of RST established</li> <li>• Number of reported deficiencies in the GANDD</li> </ul>		
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• <b>High level commitment to certify aerodromes:</b> Thru GREPECAS decisions, Directors of CAA's are encourage to present a plan to certify a minimum number of aerodromes per year in the next 3 years, in order to contribute with the Regional goal of increasing aerodromes certified.</li> <li>• <b>Data and information gathering:</b> Through a cooperation mechanism (to be defined with States and Industry partners), the Project will carry out a survey to collect data and define the level of maturity of available documentation/ procedures to engage initial aerodrome certification.</li> <li>• <b>Data and information analysis:</b> after collecting the data, this will allow the Project specialists to make a Gap Analysis and define required solutions (guidelines, documentation, Go Teams, technical cooperation, seminars, workshops, etc.) following the Pareto principle.</li> </ul>		

CAR Region	PROJECT DESCRIPTION (PD)	PD N° F1	
<i>Programme</i>	Project Title	Start	End
<i>Aerodromes</i>  (Programme Coordinator: <i>Jaime Calderon</i> )	<i>Aerodrome Safety and Certification</i>  <i>Project Coordinator: TBD</i>	July 2017	July 2020
	<ul style="list-style-type: none"> <li>• <b>Establish State sub-projects:</b> The Project will then establish per-State sub-projects with a common methodology so that all State's certification programs may be monitored by the Programme coordinator. These sub-projects will have, among other tasks:</li> <li>• Analyze high level commitment and resources available for aerodrome certification (on States and Aerodrome Operators).</li> <li>• Assess State framework and aerodrome certification program to identify potential support from other Contracting State(s), RSOO's, International Organizations or the RO's</li> <li>• Give the State and the Project a coordination tool to measure their improvement and identify possible bottlenecks.</li> <li>• <b>Initial certification of aerodromes with a % of compliance with ICAO SARP's:</b> consequently, as States implement their program, aerodromes will receive initial certification so that the continuous surveillance phase can begin. This initial certification will be based on a % of compliance with ICAO SARP's.</li> </ul>		
<b>Goals</b>	<ul style="list-style-type: none"> <li>• Survey on available documentation, procedures and competent staff for aerodrome certification at States. YE2017</li> <li>• Regional aerodrome manual template for aerodrome certification process. YE2018</li> <li>• Regional Runway Safety Team guidelines, terms of reference for implementation based on ICAO and industry best practices. YE2019</li> <li>• Regional minimum Aerodrome SMS requirements to apply for an aerodrome initial certification. YE2018</li> <li>• Regional "modification of standards" procedure for aerodrome operators to present requests for exemptions and apply for initial aerodrome certification. YE2019</li> <li>• 100% of States with State Certification Programme for each designated aerodrome. YE2020</li> <li>• 80% of aerodromes with initial certification completed. <i>(to be assessed after gap analysis)</i>. YE2020</li> <li>• 100% States with sufficient number and competent aerodrome inspectors or with arrangements and legal mechanisms to delegate to other entities (other States, RSOO's, etc.). YE2020</li> <li>• 100% of State's Aerodrome regulatory agencies with agreed minimum qualification and experience requirements for delegation of aerodrome certification tasks. YE2020</li> <li>• 80% of international aerodromes with established Runway Safety Teams. <i>(to be assessed after gap analysis)</i>. YE2020</li> </ul>		

<b>CAR Region</b>	<b>PROJECT DESCRIPTION (PD)</b>	PD N° F1	
<i>Programme</i>	<b>Project Title</b>	<b>Start</b>	<b>End</b>
<i>Aerodromes</i>  (Programme Coordinator: <i>Jaime Calderon</i> )	<i>Aerodrome Safety and Certification</i>  <i>Project Coordinator: TBD</i>	July 2017	July 2020
<b>Rationale</b>	<ul style="list-style-type: none"> <li>• According to ICAO, almost 60 per cent of contracting States in the world have not fully implemented the requirements for the certification of aerodromes. More than 50 per cent of the States have not established a comprehensive aerodrome certification process, including all the necessary assessments. In addition, almost 60 per cent of the States have not established, in the framework of their certification process, a mechanism based on safety assessments, for reviewing and accepting non compliances with established requirements.</li> <li>• Also, more than 60 per cent of the States do not ensure that their aerodrome operators have established and implemented integrated strategies, including Runway Safety Teams (RSTs), for the prevention of runway incursions and other accidents and incidents at aerodromes.</li> <li>• By 2016, CAR Regional office has accomplished 45% of international aerodromes certified.</li> </ul>		
<b>Related Projects</b>	<ul style="list-style-type: none"> <li>• TBD</li> </ul>		

Project Deliverables	Relationship with the regional performance based air navigation plan (RPBANIP)	Responsible	Status of Implementation	Delivery Date	Comments
Survey to States on current national approved regulations/procedures on aerodrome certification, in order to set the baseline documentation needs.	5. Enhance Capacity and Efficiency of Aerodrome Operations in the CAR Region	TBD	0%	2Q-2018	The State specialist will develop a survey to identify the needs of each State's documentation (regulations, procedures, etc.) in order to better target assistance.
Collect best practices from States to develop guidance material (templates)	5. Enhance Capacity and Efficiency of Aerodrome Operations in the CAR Region	TBD	0%	open	After exploring what is available from States, the specialist will organize all documentation and experiences needed to engage aerodrome certification in order to simplify the process.
Review the survey's results and prepare a plan, on a Regional and State level to support the identified gaps	5. Enhance Capacity and Efficiency of Aerodrome Operations in the CAR Region	TBD	0%	CRPP/5(2019)	The plan will define what is required (elaboration of documentation, workshops, training, etc.).
Plan for initial certification Go-Teams (with support of partners/stakeholders)	5. Enhance Capacity and Efficiency of Aerodrome Operations in the CAR Region	TBD	25%	2Q-2018	Continue with Go-Teams with the support of partners to begin initial certification at designated airports.
Prepare a plan to implement RST's per designated airport	5. Enhance Capacity and Efficiency of Aerodrome Operations in the CAR Region	TBD	25%	2Q-2018	Create a template for Terms and Reference of the RST and a plan based on safety data for RST implementation.

Project Deliverables	Relationship with the regional performance based air navigation plan (RPBANIP)	Responsible	Status of Implementation	Delivery Date	Comments
Runway Safety Go-Teams (with support of ICAO HQ, States, FAA, ACI and other partners/stakeholders)	5. Enhance Capacity and Efficiency of Aerodrome Operations in the CAR Region	TBD	25%	3Q-2018 and onwards	With the support and commitment of States and airport Operators, FAA and ACI plan Go Teams for RST implementation at designated airports.
<b>Resources needed</b>	<ul style="list-style-type: none"> <li>• High level commitment on each participating State.</li> <li>• The provision of counterparts in each State, on a Matrix Management approach, to the project.</li> <li>• Designation of experts by States (direct assistance) is needed in the execution of some of the deliverables.</li> <li>• Access to State regulations, advisory circulars, and other best practices available.</li> </ul>				

-----

## APPENDIX G

## PROJECT ON AERODROME SAFETY AND CERTIFICATION – SAM REGION

SAM Region	PROJECT DESCRIPTION (PD)	PD N° F1	
<i>Programme</i>	Project Title	Start	End
<i>Aerodromes</i>  (Programme Coordinator: Fabio Salvatierra ICAO AGA RO)	<i>Aerodrome Safety and Certification</i>  <i>Project Coordinator: To be determined</i>	April 2018	July 2020
<b>Objective</b>	Assist States in the SAM Region to increase the number of certified aerodromes and the establishment of runway safety mechanisms (e.g. Runway Safety Teams) to tackle runway safety related events at designated aerodromes.		
<b>Scope</b>	The scope of the project includes the identification of latent problems or bottlenecks in the aerodrome certification process, in order to better assess States complying regional targets and develop tailored needs in relation to, documentation, processes and procedures, development of guidelines, training, expert advice, best practices, and data and information collection, to enable initial certification of aerodromes and continuous surveillance.		
<b>Metrics</b>	<ul style="list-style-type: none"> <li>• Number of aerodromes certified per State</li> <li>• % of aerodromes certified per Region</li> <li>• Number of AGA inspectors per State</li> <li>• State EI % in the AGA area</li> <li>• Number of RST established</li> <li>• Number of reported deficiencies in the GANDD</li> </ul>		
<b>Strategy</b>	<ul style="list-style-type: none"> <li>• <b>High level commitment to certify aerodromes:</b> Thru GREPECAS decisions, Directors of CAA's are encouraged to present a plan to certify a minimum number of aerodromes per year in the next 3 years, in order to contribute with the Regional goal of increasing aerodromes certified.</li> <li>• <b>Data and information gathering:</b> Through a cooperation mechanism (to be defined with States and Industry partners), the Project will carry out a survey to collect data and define the level of maturity of available documentation/procedures to engage initial aerodrome certification.</li> <li>• <b>Data and information analysis:</b> after collecting the data, this will allow the Project specialists to make a Gap Analysis and</li> </ul>		

	<p>define required solutions (guidelines, documentation, Go Teams, technical cooperation, seminars, workshops, etc.) following the Pareto principle.</p> <ul style="list-style-type: none"> <li>• <b>Establish State sub-projects (certification Program (3 year) and Yearly Plans):</b> The Project will then establish (with the support of States specialists and under coordination of Programme coordinator) per-State sub-projects with a common methodology so that all State's certification programs may be monitored by the Programme coordinator. These sub-projects will, among other tasks: <ul style="list-style-type: none"> <li>– Analyze high level commitment and resources available for aerodrome certification (on States and Aerodrome Operators).</li> <li>– Assess State framework and aerodrome certification program to identify potential support from other Contracting State(s), RSOO's, International Organizations or the RO's</li> <li>– Give the State and the Project coordination a tool to measure their improvement and identify possible bottlenecks.</li> </ul> </li> <li>• <b>Initial certification of aerodromes:</b> consequently, as States implement their program, aerodromes will receive initial certification so that the continuous surveillance phase can begin. This initial certification will be based on current conditions, with exemptions or alternate methods of compliance if applicable.</li> <li>• <b>Initiate implementation of RST to each designated aerodrome:</b> as part of the airport certification process, formally establish runway safety teams in each designated aerodrome, following common guidelines based on ICAO supporting documents.</li> </ul>
<b>Goals</b>	<ul style="list-style-type: none"> <li>• Survey on available documentation, procedures and competent staff for aerodrome certification at States. YE2017</li> <li>• Regional aerodrome manual template for aerodrome certification process. YE2018</li> <li>• Regional Runway Safety Team guidelines for implementation based on ICAO and industry best practices. YE2019</li> <li>• Regional minimum Aerodrome SMS requirements to apply for an aerodrome initial certification. YE2018</li> <li>• Regional "modification of standards" or "safety cases" procedure for aerodrome operators to present requests for exemptions and apply for initial aerodrome certification. YE2019</li> <li>• 100% of States with State Certification Programme for designated aerodrome. YE2019</li> <li>• % (to be defined by SAM Plan) of international aerodromes with initial certification completed. YE2020</li> <li>• % (to be defined by SAM Plan) States with sufficient and competent aerodrome inspectors or with arrangements and legal mechanisms to delegate to other entities (other States, RSOO's, etc.). YE2020</li> <li>• % (to be defined by SAM Plan) of international aerodromes with established Runway Safety Teams. YE2020</li> </ul>

<b>Rationale</b>	<ul style="list-style-type: none"><li>• According to ICAO (USOAP CMA Safety Report 2015), almost 60 per cent of contracting States in the world have not fully implemented the requirements for the certification of aerodromes. More than 50 per cent of the States have not established a comprehensive aerodrome certification process, including all the necessary assessments. In addition, almost 60 per cent of the States have not established, in the framework of their certification process, a mechanism based on safety assessments, for reviewing and accepting non compliances with established requirements.</li><li>• Also, more than 60 per cent of the States do not ensure that their aerodrome operators have established and implemented integrated strategies, including Local Runway Safety Teams (LRSTs), for the prevention of runway incursions and other accidents and incidents at aerodromes.</li><li>• By February 2018, SAM Regional office has accomplished about 30% of international aerodromes certified.</li></ul>
<b>Related Projects</b>	<ul style="list-style-type: none"><li>• TBD</li></ul>

<b>Project Deliverables</b>	<b>Relationship with the regional performance-based plan (PFF)</b>	<b>Responsible</b>	<b>Status of Implementation</b>	<b>Date of Delivery</b>	<b>Comments</b>
Survey to States on current national approved regulations/procedures on aerodrome certification, in order to set the baseline documentation needs.	PFF SAM AGA 02	TBD	0%	2Q-2018	The State specialist will develop a survey to identify the needs of each State's documentation (regulations, procedures, etc.) in order to better target assistance.
Collect best practices from States to develop guidance material (templates) and incorporate them to the LAR AGA set	PFF SAM AGA 02	TBD	0%	OPEN	After exploring what is available from States, the specialist will organize all documentation and experiences needed to engage aerodrome certification in order to simplify the process.
Review the survey's results and prepare a plan, on a Regional and State level to support the identified gaps	PFF SAM AGA 02	TBD	0%	CRPP/5(2019)	The plan will define what is required (preparation of documentation, workshops, training, etc.) using the Pareto principle, in which we get the most results with less resources.
Prepare methodology (procedure and templates) for States to present their Certification sub-projects	PFF SAM AGA 02	TBD	0%	CRPP/5 (2019)	The State specialist will prepare a procedure with templates to present their certification project per designated airport per State
Plan for initial certification Go-Teams (with support of SRVSOP and other partners/stakeholders)	PFF SAM AGA 02	TBD	0%	YE2020	Plan Go-Teams with the support of SRVSOP and other partners to begin initial certification at volunteered locations.
Prepare guidance (in Spanish) for the creation of RST's	PFF SAM AGA 02	TBD	0%	CRPP/5 (2019)	Based on ICAO RST Handbook, create a regional RST guideline to advise operators on the implementation of RST's.
Prepare a plan to implement RST's per designated airport	PFF SAM AGA 02	TBD	0%	CRPP/6 (2020)	With the support and commitment of States and airport Operators, prepare an implementation plan for States to comply with targets of RST implementation.
Runway Safety Go-Teams (with support of ICAO HQ, States, ACI and other partners/stakeholders)	PFF SAM AGA 02	TBD	0%	2020-onwards	Plan RS Go-Teams with the support of ICAO HQ, other States and ACI to engage the creation of RST's.

Project Deliverables	Relationship with the regional performance-based plan (PFF)	Responsible	Status of Implementation	Date of Delivery	Comments
<b>Resources needed</b>	<p>High level commitment on each participating State.  The provision of counterparts in each State, on a Matrix Management approach, to the project.  Designation of experts by States (direct assistance) is needed in the execution of some of the deliverables.  Access to State regulations, guidance, manuals, procedures, advisory circulars, and other best practices available.</p>				

## REPORT OF E TOD AD HOC GROUP

### 1. Delegates of the States participating:

Brazil, Costa Rica, Dominican Republic, Panama, Trinidad and Tobago, Uruguay and the Secretariat (ROs AIM CAR and SAM), delegates from Cuba and CANSO also expressed their intention to be part of the future works.

### 2. As a result of the presented proposals to the Meeting with WP/29, it was agreed to convene an Ad hoc working group to address the e TOD implementation and define the activities. The Meeting was presided by the Secretariat; Mr. Jorge Armoa acted as Rapporteur, providing a brief introduction. The working group endorsed the discussion based on the proposal consisting of seven points identified on this task of WP/29, as follows:

- i. Implement adequate regulations to support the collection and management of eTOD data with regards to the responsible authority - State/Government Authorities, Air Navigation Service Providers (ANSPs), Aerodrome Operators, Military part, etc.
- ii. Define the method in which the data will be collected, either through surveying (using WGS-84) or through other means (drones, satellite imagery/3D graphic/LIDAR information processing).
- iii. Define the format in which the data will be stored and distributed.
- iv. Implement the required infrastructure (a database -GIS) capable of managing/hosting the eTOD data. (The database must be capable of loading the required terrain data in either Digital Surface Model (DSM) or Digital Terrain Model (DTM) format with associated Meta-Data traceability)
- v. Ensure the State has the required resources to manage and maintain the eTOD Database in coordination with the Military representatives (National Security issues).
- vi. Ensure the resources of the State are adequately trained in managing terrain and obstacle data (i.e., understanding the complexities of terrain data file formats and packaging of these terrain data files).
- vii. Ensure the State has implemented a Quality Management System (QMS) with associated processes and procedures to ensure quality in the processing of data from originator to publication (Controlled Harmonized Aeronautical Information Network – CHAIN) in the AIP AD 2.10 section (or other related IAIP documents).

### 3. The Group proposals are:

- a. An exchange between Geodesy institutions and Aeronautical Charts is proposed to States
- b. Prioritize eTOD Area 3 for international airports
- c. Assess the resources assignments for a number of airports in each CAR and SAM State
- d. Establish a period of time for the development of plans for each phase of the projects
- e. Use of satellite images and LIDAR data for Areas 1 and 2, as well as the use of drones for Areas 3 and 4

- 
- f. Share expenses among several institutions of the State that could obtain benefits after a cost-benefit analysis, maintaining continuity in the eTOD Project with enough resources
  - g. Establish working agreements among all the State institutions and with the military to perform works, prioritizing Areas 1 and 2
  - h. Consider the software for the 3D Data management in order to obtain eTOD products
  - i. Request States that have already initiated the eTOD to share information and experts to guide other States as needed
  - j. Integrate Universities and Charting Institutes/geodetic to the Project
  - k. Identify the project risks and prepare the resolution plans
  - l. Create a Team to analyze cost-benefit per State for CAR and SAM Regions
4. The Ad hoc group will continue the communication to follow-up on the tasks and activities on both Regions in a coordinated way, progress will be reported to all AIM ROs from CAR and SAM. Such progress will be reported in the PPRC/5 Meeting with a working paper.

## APPENDIX I

### Current status of the implementation of air navigation improvements in ATM area

#### 1. PBN Implementation

##### PBN en route

1.1 The implementation of PBN en route was based on route network versions to ensure that the best airspace structure was available. Information was provided on the results of the ATSRO/08 meeting held in September 2017, where 95 initiatives were analysed, based on Version 04 of the route network, of which 30 had been accepted and 3 rejected. The remaining 52 initiatives would be the subject of coordination.

1.2 Conclusion ATSRO/8-1 defined a 3-stage timetable for the publication of route modifications on AIRAC dates in June, August and October 2018, taking into account two AIRAC cycles prior to effective implementation.

1.3 The SAM Region had continued optimising the route network, covering 65% of upper airspace routes, exceeding by 5% the 60% goal established in the Declaration of Bogota.

1.4 As a result of the PBN meetings held in the CAR Region in 2016, Brazil, Guyana, Suriname and Venezuela had optimised a set of RNAV routes in their FIRs on 17 August 2017.

1.5 A meeting of SAM States has been scheduled for April 2018 for updating Letters of Agreement and Contingency Plans. This meeting would review data on aircraft transfer and ATS management on optimised routes, and coordinate with the Mexico NACC Office for the development of joint route improvement initiatives based on NAM and CAR flows.

##### PBN in TMAs

1.6 Regarding recent implementations, the new PBN airspace of the Asunción FIR and TMA became effective in August 2017. Likewise, *Aerocivil* of Colombia implemented the new Bogota TMA with RNAV/RNP standard routes and approach procedures on 12 October 2017.

1.7 In Brazil, through the PBN SUL project that also became effective on 12 October 2017, several main TMAs, such as Curitiba, Florianopolis and Porto Alegre, had been optimised.

1.8 Regarding progress made by Argentina, PBN procedures had been implemented at the airports of Aeroparque, Córdoba, Salta and Iguazú, amongst others. In this respect, Suriname is taking action to implement PBN routes and procedures for the Paramaribo international airport airspace by February 2018.

1.9 Panama is currently defining a process for airspace improvement and redesign at the Tocumen TMA. It expected to initiate the project in early 2018 and a roadmap with deadlines would be available by then. They also expected to implement a new National air navigation plan.

1.10 Argentina, Brazil and Paraguay have completed the tripartite implementation of the FOZ TMA in October 2017 (covering operations at the airports of Foz de Iguazú, Cataratas and Guaraní). Argentina and Paraguay informed that the bipartite PBN planning for the Posadas TMA (covering the

airspace of the Encarnación and Posadas airports), is under development in order to be implemented in February 2019.

1.11 The progress made in PANS-OPS training of staff in the administrations of Argentina, Bolivia, Ecuador, Guyana, Peru and Uruguay, shows that the number of designers in the Region was gradually increasing.

1.12 The tentative dates for PBN implementation in the remaining TMAs of the Region is shown in the following table:

<b>Redesign of selected TMA airspaces based on PBN planning</b>			
<b>State</b>		<b>Implementation</b>	
<b>Argentina</b>	BAIRES	Phase 1.- October 2017. Optimisation of available resources. Phase 2.- 2017-2020. Introduction of the PBN concept. (See SAM/IG/20-NI/04)	
<b>Bolivia</b>	Cochabamba	Phase 1.- July 2018. PBN design but also considering conventional procedures. Phase 2.- August 2019. Definitive PBN design, considering airspace with ATS surveillance.	
	La Paz		
	Santa Cruz		
<b>Brazil</b>	Brasilia	12 Nov 2015 (implemented)	
	Belo Horizonte	12 Nov 2015 (implemented)	
	Sao Paulo (partial modifications)	12 Nov 2015 (implemented)	
	Salvador	27 Apr 2017 (implemented)	
	Manaus	17 Aug 2017 (implemented)	
	(PBN SUR)	Curitiba	12 Oct 2017 (implemented)
		Florianopolis	
		Joinville	
		Navegantes	
		Porto Alegre	
		São Paulo (modifications)	
		Red de ruta FIR CW	
	Fortaleza, Natal and Maceió	September 2019	
	Vitória	October 2018	
Belém, Campo Grande and Sao Luis	October 2021		
Cuiabá, Boa Vista, Porto Velho and Rio Branco	October 2023		
Sao Paulo	TBD		
<b>Chile</b>	Santiago (South)	08 Dec 2016 (implemented)	
	Santiago FIR route network		
<b>Colombia</b>	Bogota	12 Oct 2017 (implemented)	

<b>Redesign of selected TMA airspaces based on PBN planning</b>		
<b>State</b>		<b>Implementation</b>
<b>Ecuador</b>	Guayaquil	21 Jul 2016 (implemented)
<b>Panama</b>	Panamá	Project start-up in 2018. (See SAM/IG/20-IP/10)
<b>Paraguay</b>	Asunción	17 Aug 2017 (implemented)
<b>Peru</b>	Arequipa	December 2018
	Cusco	December 2018
	Juliaca	December 2018
	Puerto Maldonado	December 2018
<b>Uruguay</b>	Carrasco and Laguna del Sauce	First semester of 2018  * The Carrasco TMA will be optimised in accordance with Phase 2 of the Baires TMA.
<b>Venezuela</b>	Maiquetía	December 2017
	Isla Margarita	Second semester of 2018

### **Implementation of PBN SIDs, STARs and approach procedures**

1.13 Taking into account recent implementations in Argentina, Brazil, Colombia and Paraguay, PBN SIDs/STARs implementation as of 12 October 2017 reached 72.9%, exceeding the 60% goal of the Declaration of Bogota.

1.14 Associated to the design of arrival and departure procedures was the application of CDO and CCO, which had reached 34% and 26% implementation, respectively.

1.15 Regarding compliance with ICAO Resolution A37-11 concerning the implementation of PBN approaches, the States continued making efforts to reach 100%, which was to be achieved in 2016. As of 12 October 2017, implementation had reached 78.6%.

### **Estimated fuel savings/CO2 emissions reduction**

1.16 With IFSET tool, it was estimated that, between January 2014 and December 2016, the airspace improvements in the States of the SAM Region resulting from PBN application for the realigning of regional routes and the implementation of standardized departure and arrival RNAV/RNP routes in Terminal Control Areas, has allowed to generate CO<sub>2</sub> reduction in the order of 211.098 tonnes, according to the following charts:

<i>Year</i>	<i>Reduction in CO<sub>2</sub> Tonnes generating routes optimizations</i>
2014	51.132
2015	23.351
2016	11.000

Chart 1: Reduction of CO<sub>2</sub> due to routes optimization

<i>Year</i>	<i>Tonnes CO<sub>2</sub></i>	<i>CO<sub>2</sub> Tonnes Cumulative Reduction</i>
2014	51.132	51.132
2015	23.351 + 51.132	74.483
2016	11.000 + 74.483	85.483
	<b>Total 2014 a 2016</b>	<b>211.098</b>

Chart 2: Cumulative CO2 reduction due to routes optimization in 2014 – 2016 period

1.17 Consequently, the goal of 40.000 Tonnes of CO2 emissions reduction per year, considered in the Declaration of Bogota for 2016, has been exceeded. It should be emphasized that the implementation of routes optimization in the Region has continued during the first semester of 2017, estimating that this generates an additional reduction of 8.033 CO2 Tons.

### **Standardization of longitudinal separations minima**

1.18 As a complementary initiative to en route space optimization, letters of agreement between SAM States have been subscribed to apply longitudinal separation minima (LSM) of 40 NM, as a first phase that will involve the application of 20 NM LSM standardized in Doc 4444 PANS ATM, for aircraft equipped to received DME distance data and/or GNSS distance in continental spaces.

1.19 In the workshop carried out the first week of November 2017, the implementation of 40 NM LSM was analyzed, at a regional and interregional basis, and the actions to implement a separation of 20 NM, highlighting Brazil's initiative presented in SAMIG/20 to apply 20 NM LSM to every aircraft entering their FIRs.

1.20 In this context, the need to encourage the application of 40 NM separation minima in La Paz FIR has been identified, where letters of agreement have not yet been totally implemented and is complicating the implementation of optimized longitudinal separation in adjacent FIRs in regional routes and important flows, as Panama – Argentina / Uruguay.

1.21 Coordination with Argentina is also required, since a separation of 40 NM is not totally being applied to transfer aircraft to the Resistencia FIR, which affects, inter-alia, the coordination with Asunción ACC.

### **Follow-up to ATFM implementation**

2.1 The goals in relation to ATFM implementation are not yet consolidated in the Region, although States and RLA/06/901 efforts in preparing and developing guidance material and enabling ATFM training courses.

2.2 In order to analyse compliance with ATFM goals, the following indicators have been considered:

- Percentage of States that have performed runway and ATC sector capacity calculations
- Percentage of States that have implemented ATFM at flow management units (FMUs) or flow management positions (FMPs)

2.3 85% of the States of the Region have performed runway capacity calculations as a task prior to implementation. During the meeting, Paraguay reported that it had completed ATC sector calculations, totalling 9 States of the Region--that is 64%--that have performed such calculations.

2.4 The metrics for flow unit implementation in the SAM Region remains at 63%.

2.5 Bolivia intended to promote ATFM implementation activities at the DGCA, without that meaning that the provider (AASANA) would no longer participate in the provision of the ATFM service at the ACC.

### **Issuance of NOTAMs on flow control measures**

2.6 Conclusion SAM/IG/19-01 called for the strengthening of FMP/FMU functions by means of resources and trained personnel with powers to coordinate with ATS services the implementation of ATFM initiatives (TMI) in case of air traffic capacity/demand imbalances caused by scheduled or unforeseen events.

2.7 It is of utmost importance the implementation of the actions specified in conclusion SAM/IG/19-01, urging States that had not yet implemented ATFM to install at least one ATFM management position (FMP) in order to balance the demand of aircraft operations with service capacity in the airspace and international aerodromes.

### **Updating of the ATFM CONOPS**

2.8 SAM/IG/20 Meeting analysed a proposal to review the contents of the Concept of Operations - ATFM CONOPS and the status of implementation of ATFM. It also agreed that the ATFM CONOPS should be geared towards the development of a second implementation phase consisting of the identification and measurement of the expected performance objectives. Accordingly, it should be updated based on the following guidelines:

- It should fall within the framework of the new edition of ICAO Doc 9971.
- To date, different results have been obtained in ATFM implementation. In general, the ATFM has allowed for demand/capacity balancing in runways and ATS airspaces, and a reduction of delays in major airports through the application of domestic air traffic initiatives.
- Progress has been made in runway and ATC sector capacity measurements, in view of the availability of a methodology and the respective training. It is necessary to promote a periodic review and updating of these measurements when the scenarios change.
- Regarding the efficiency of en-route operations and management of overflying aircraft, a better application and understanding of the ATFM concept is perceived upon having reduced the issuance of NOTAMs with unilateral flow control measures. However, the application of initiatives between adjacent FMPs/FMUs must be emphasized.

- Although they are implemented separately, there is a strong linkage and interaction between runway and airspace ATFM and aircraft operations (AOP) to/from parking stands, pushback and start-up area, and taxiways. Accordingly, their linkage to A-CDM processes being implemented at some international airports of the Region is also essential.

#### **CADENA CDM sessions**

2.9 Conducting ATFM teleconferences is of utmost importance for the Region, as well as promoting a communication routine in support of CDM and TMIs, while facilitating linkage between ACCs or ATFM units at the FIR boundaries of the CAR/SAM Regions.

2.10 Participation in the CANSO CADENA sessions as an observer is being carried out since July 2017. The aforementioned teleconferences link up ATFM units, generating a communication and collaboration routine among the participants. These teleconferences are also attended by the airlines, IATA, FAA and other organisations, favouring feedback. The ANSPs of Argentina and Brazil have been participating in the initiative since its inception.

2.11 Chile, Panama, Paraguay, Peru and Venezuela are participating in the weekly sessions of CADENA, and would provide their input at the ATFM workshop/meeting to be held in March 2018 for its corresponding analysis.

## APPENDIX J

## AIM AREA

<b><i>B0 – DATM: Service improvement through digital aeronautical information management 2017-2019</i></b>				
<b>ELEMENTS</b>	<b>SCOPE</b>	<b>INDICATORS/ METRICS</b>	<b>GOALS: %/ Date</b>	<b>STATUS</b>
1 - AIXM	All States	Indicator: % of States that have implemented AIXM in an AIS database.  Metrics: Number of States that have implemented AIXM in an AIS database.	<b>Tests</b> 2016 (4 States: ARG, BRA, PAN, URU)  28% by 2017 49% by 2018 100% by 2019	XX% (X States)
2 – electronic AIP	All States	Indicator: % of States that have implemented an IAID to manage the production of the electronic AIP (eAIP).  Metrics: Number of States that have implemented an IAID to manage the production of the electronic AIP (eAIP).	30% by 2017 60% by 2018 100% by 2019	XX% (X States)
3 – Electronic terrain and obstacle data (e-TOD)	All States	Indicator: % of States that have implemented the terrain data set.  Metrics: Number of States that have implemented the terrain data set.  Indicator: % of States that have implemented the obstacle data set.  Metrics: Number of States that have implemented the obstacle data set.	<b>Area 1:</b> Terrain: 100% by 2016  Obstacles: 49% by 2016 51% by 2017	<b>Area 1:</b> Terrain: XX% (XX States)  Obstacles: XX% (XX States)

<b>B0 – DATM: Service improvement through digital aeronautical information management 2017-2019</b>				
<b>ELEMENTS</b>	<b>SCOPE</b>	<b>INDICATORS/ METRICS</b>	<b>GOALS: %/ Date</b>	<b>STATUS</b>
Cont.: 3 – Electronic terrain and obstacle data (e-TOD)	All States	Indicator: % of States that have implemented the data set on terrain and obstacles that penetrate the terrain and obstacle data collection surface.  Metrics: Number of States that have implemented the data set on terrain and obstacles that penetrate the terrain and obstacle data collection surface.	<b>AREA 2b, 2c and 2d</b>  Terrain: 100% by 2017  Obstacles: 100% by 2017	<b>AREA 2b, 2c and 2d</b> Terrain: XX% (XX States)  Obstacles: XX% (XX States)
4 - Digital NOTAM	All States	Indicator: % of States that have included the digital NOTAM in their National plan for the transition from AIS to AIM.  Metrics: Number of States that have included the digital NOTAM in their National plan for the transition from AIS to AIM.	28% by 2017  56% by 2018  100% by 2019	XX% (XX States)
5- Integrated aeronautical information databases (IAID)	All States	Indicator: % of States that have developed integrated aeronautical information databases (IAID).  Metrics: Number of States that have developed integrated aeronautical information databases (IAID).	28% by 2017  56% by 2018  100% by 2019	XX% (XX States)

**CONSIDERATIONS REGARDING AIM AREA IMPLEMENTATIONS**

- QMS/AIM implementation
  - Delays in the implementation in Bolivia, Guyana and Suriname.
  - Delays in completing implementation in Colombia, Ecuador and Venezuela.
  - Lack of plans for adjusting to ISO 9001 version 2015 in Argentina and Uruguay.
  
- e- TOD implementation
  - Implementation plans with remote horizons.
  - Several States have not even submitted implementation plans.
  - High compliance cost.
  - Cost-benefit analyses should be carried out in the Region.
  - At present, it is a GANDD deficiency.
  
- AIXM
  - Some progress has been made, but more investment is needed.
  - It must be accompanied by AMHS interconnections.
  
- E-AIP
  - Brazil, Peru, Colombia, Panama and Venezuela showed significant progress.
  - States need to invest more in order to meet the deadlines.
  
- Digital NOTAM
  - The initial horizon must be modified to 2019.

## APPENDIX K

## MET AREA

<i>B0 – AMET: Meteorological information supporting enhanced operational efficiency and safety</i>						
ELEMENTS	SCOPE	INDICATORS / METRICS	GOALS: %/ Date			STATUS
			2017	2018	2019	
MET/QMS as per ISO 9001:2015	All States	Indicator: % of States that have implemented the MET/QMS (100% by the end of 2018)  Support metrics: Number of States that have implemented the MET/QMS	8	10	14	All States should update their QMS / MET documentation to align the change to ISO 9001. By 2016, seven States have implemented and certified the QMS / MET in their aeronautical meteorological services in the 2008 version of the Standard. Currently, 5 States have implemented the ISO 9001 Standard with the 2015 version.
Implementation of SIGMET messages in graphical format	All States	Indicator: % of international aerodromes /MWOs that have implemented graphical procedures  Support metrics: Number of international aerodromes /MWOs that have implemented graphical SIGMET procedures	6	8	12	At present, 7 States have implemented SIGMET messages in graphical format.
Implementation of the IAVW procedure	All States	Indicator: % of international aerodromes /MWOs that have implemented IAVW procedures  Support metrics: Number of international aerodromes/ MWOs that have implemented IAVW procedures	7	9	12	
Implementation of the OPMET messages in	All States	Indicator: % of States that have implemented OPMET messages in XML/GML format	4	6	9	Brazil has implemented a message converter

<b>B0 – AMET: Meteorological information supporting enhanced operational efficiency and safety</b>						
<b>ELEMENTS</b>	<b>SCOPE</b>	<b>INDICATORS / METRICS</b>	<b>GOALS: %/ Date</b>			<b>STATUS</b>
			<b>2017</b>	<b>2018</b>	<b>2019</b>	
XML/GML format		Support metrics: Number of States that have implemented OPMET messages in XML/GML format				to XML / GML format in the OPMET Data Bank of Brasilia. Venezuela and Ecuador have prepared computer applications that transform alphanumeric messages into XML formats. Transmissions of OPMET messages in XML / GML format require interconnection in AMHS between the States.
Implementation of tropical cyclone watch procedures	States that require this procedure	Indicator: % of international aerodromes /MWOs that have tropical cyclone watch  Support metrics: Number of international aerodromes/ MWOs with tropical cyclone watch	2	3	4	Only Colombia, Guyana, French Guiana, Panama, Suriname and Venezuela might be affected by tropical cyclones in the SAM Region.
Watch procedures implemented for the release of radioactive material	All States	Indicator: Percentage of Meteorological Watch Offices (MWOs) that have implemented watch procedures for the release of radioactive material  Support metrics: Number of MWOs that have signed operational cooperation agreements with ACCs for the transmission of radioactive material release reports.	2	4	7	States must submit agreements with national atomic energy authorities and with ANS providers.
Implementation of wind shear warning and alert procedures	All States	Indicator: Percentage of international aerodromes /AMOs that have implemented wind shear warning and alert procedures	6	9	12	

<i>B0 – AMET: Meteorological information supporting enhanced operational efficiency and safety</i>						
ELEMENTS	SCOPE	INDICATORS / METRICS	GOALS: %/ Date			STATUS
			2017	2018	2019	
		Support metrics: Number of international aerodromes /AMOs that have implemented wind shear warning and alert procedures				

**CONSIDERATIONS REGARDING MET AREA IMPLEMENTATIONS**

- QMS/MET implementation
  - Concern of the Secretariat for the delay in the implementation in some States. Note should be taken on the support provided by the Secretariat and World Meteorological Organization (WMO) for the implementation of the QMS/MET.
  - Lack of plans to adapt to ISO 9001 version 2015 in some States that have already completed QMS/MET implementation.
  
- Release of radioactive material
  - Coordinate procedures between the ANSP and the MET provider for cases of release of radioactive material.
  
- Implementation of other MET elements
  - State civil aviation authorities should ask the MET provider to implement these elements.

## APPENDIX L

## AMHS INTERCONNECTION REQUIREMENT AND DATE OF IMPLEMENTATION

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
Argentina	Bolivia	Dec 2018	Pending initial coordination
	Brazil	Nov 2017	Final operational tests for AMHS interconnection between Brasilia and Ezeiza were successfully completed on 18 May 2016. Pending decision from authorities of Argentina and Brazil for operational implementation.
	Chile	Nov 2017	Positive operational tests carried out on mid December 2016. Pending decision from authorities of Argentina and Chile for operational implementation.
	Paraguay	Mar 2012	Implemented and operational
	Peru	Nov 2017	Positive operational tests carried out at the end of 2016. Pending decision from authorities of Argentina and Peru for operational implementation.
	South Africa	Jun 2019	Coordination began on December 2016. Interconnection implementation will be made through CAFSAT. Modernization of CAFSAT node Ezeiza is foreseen by mid-2018.
	Uruguay	Dec 2017	Connectivity in Protocol P1 level between MTA Ezeiza – Montevideo. Operational test foreseen November 2017.
	Venezuela	Dec 2017	Implemented and operational (out of service- failure in AMHS Venezuela) since Dec 2016. Operational since 20 September 2017. Tests foreseen for November 2017.
	SITA (Atlanta)	Dec 2017	Positive connectivity tests carried out. Operation foreseen December 2017.
Bolivia	Argentina	Dec 2018	Pending initial coordination
	Brazil	Jun 2018	Pending initial coordination
	Peru	Mar 2018	IP connectivity between La Paz and Lima MTAs achieved.
Brazil	Argentina	Nov 2017	Final operational tests for AMHS interconnection between Brasilia and Ezeiza were successfully completed on 18 May 2016. Pending decision from authorities of Argentina and Brazil for operational implementation.
	Bolivia	Jun 2018	Pending initial coordination
	Colombia	May 2017	Operational May 2017.

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
	Spain	Dec 2017	Operations scheduled December 2017. AMHS circuit implemented through CAFSAT. To date in pre-operational phase. For beginning operations, Brazil is expecting confirmation from Spain to migrate to operational phase.
	United States	Jun 2018	Coordination began between Brazil and United States. Circuit implementation will be made through MEVAIII/REDDIGII.
	Guyana	Sep 2017	Operations in Protocol P1 level begun on 16 December 2016 at 17:00 UTC. On mid-February 2017 returned to AFTN configuration. AMHS tests resume on May 2017. Connection resume on July 2017.
	French Guiana	Dec 2018	Operation of an AMHS (CONSOFT) system is schedule by January 2018. AMHS interconnection scheduled October 2018.
	Paraguay	Dec 2017	Positive P1 connectivity tests were carried out. Pending operational tests by October 2017.
	Peru	Dec 2015	Implemented and operational 14 December 2015
	Senegal	Dec 2018	Coordination began between Brazil and Senegal (Dec 2016). Interconnection will be made through AFISNET satellite network which Brazilian node was installed in Recife.
	Sita (Atlanta)	Dec 2017	Successful operational and IP interoperability tests carried out in August 2017. Operation foreseen by last quarter of 2017.
	Suriname	Mar 2018	Entered into operation on 15 Dec 2016 at 17:00 UTC. On mid-February 2017 returned to AFTN configuration. Pending updating of AMHS system by Suriname.
	Uruguay	Sep 2017	IP connectivity completed. (First week October 2016). IP Protocol tests successfully concluded the week of 28 Nov 2016 (30 Nov and 1 Dec). Positive operational tests made in August 2017 and commissioning in September 2017.
	Venezuela	Dec 2017	Positive connectivity in Protocol P1 level between Brasilia and Caracas (Oct 2016). Operational since 20 September 2017. Tests foreseen November 2017.
Chile	Argentina	Nov 2017	Positive operational tests carried out in mid-December 2016. Pending decision from authorities of Argentina and Chile

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
			for operational implementation.
	Peru	Dec 2016	Began operations on mid-December 2016.
Colombia	Brazil	May 2017	Operational May 2017.
	Ecuador	Dec 2017	Successful IP connectivity tests Pending resume of operational tests
	Panama	Mar 2018	Circuitual interconnection has been configured through MEVA III/REDDIG II (Mid-February 2017). Positive operational tests August 2017. Operational implementation will be carried out once Colombia and Panama contract the AMHS circuit with MEVA III communication provider in MEVAIII/REDDIGII interconnection.
	Peru	Sep 2010	Implemented and operational
	Venezuela	Dec 2017	Operational since 20 September 2017 with new AMHS System. Tests foreseen November 2017.
Ecuador	Colombia	Dec 2017	IP connectivity tests successfully made. Pending resume of operational tests.
	Peru	Jul 2012	Implemented and operational
	Venezuela	Dec 2017	Operational since 20 September 2017 with new AMHS System. Tests foreseen November 2017.
French Guiana (France)	Brazil	Dec 2018	French Guiana has scheduled for January 2018 the commissioning of an AMHS (CONSOFT) system. AMHS interconnection foreseen to begin October 2018.
	Venezuela	Dec 2018	French Guiana has scheduled for January 2018 the commissioning of an AMHS (CONSOFT) system. AMHS interconnection foreseen to begin on October 2018.
Guyana	Brazil	Jul 2017	Began operations on 15 Dec 2017 at 17:00 UTC. At mid-February 2017 returned to AFTN configuration. AMHS tests resumed on May 2017. Operational connection resumed on July 2017.
	Suriname	Jun 2011	Implemented and operational
	Trinidad & Tobago	Dec 2018	Pending coordination
	Venezuela	Dec 2017	Operational since 20 September 2017 with new AMHS System. Tests foreseen November 2017.
Panama	Colombia	Mar 2018	Circuitual interconnection has been configured through MEVA III/REDDIG II (mid-February 2017). Positive operational tests made on August

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
			2017. Operational implementation will take place once Colombia and Panama contract AMHS circuit to the MEVA III communications provider in MEVAIII/REDDIGII interconnection.
Paraguay	Argentina	Mar 2012	Implemented and operational
	Brazil	Dec 2017	IP interconnectivity tests began mid July 2016. Pending of operational tests on October 2017.
Peru	Argentina	Nov 2017	Positive operational tests carried out at the end of 2016. Pending decision from authorities of Argentina and Chile for operational implementation.
	Bolivia	Mar 2018	Successful IP connectivity between La Paz MTA and Lima MTA.
	Brazil	Dec 2015	Implemented 14 December 2015
	Chile	Dec 2016	Entered into operations the second half of Dec 2016.
	Colombia	Sep 2010	Implemented
	Ecuador	Jul 2012	Implemented
	United States	Dec 2018	Initial coordination has begun for the AMHS connection through the MEVAIII/REDDIGII interconnection.
	Venezuela	Dec 2017	Operational since 20 September 2017 with new AMHS System. Tests foreseen October 2017.
Suriname	Brazil	Mar 2018	Began operations on 15 Dec 2016 at 17:00 UTC. At mid-February 2017 returned to AFTN configuration. Pending Suriname AMHS system updating.
	Guyana	Jun 2011	Implemented and operational
	Venezuela	Mar 2018	Pending operational tests to be made when Venezuela has implemented its new AMHS system (September 2017) and Suriname has updated its AHMS system (date TBD). New AMHS system operative in Venezuela since 20 September 2017.
Uruguay	Argentina	Dec 2017	Positive P1 connectivity between Ezeiza and Montevideo achieved. Operational tests foreseen November 2017.
	Brazil	Sep 2017	IP connectivity tests completed (first week October 2016) Protocol P1 successfully concluded the week of 28 November 2016 (30 November and 1 December). Positive operational test made on August 2017. Commissioning September 2017.

STATES	AMHS INTERCONNECTION REQUIREMENTS	DATE OF IMPLEMENTATION	COMMENTS
Venezuela	Argentina	Dec 2017	Implemented and operational (out of service- failure in AMHS Venezuela) New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Brazil	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Colombia	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Spain	Dec 2018	Pending initial coordination. Interconnection will be made through a communication circuit rented to a local provider.
	United States	Dec 2018	Pending initial coordination. AMHS circuit will be implemented through MEVAIII/REDDIGII interconnection.
	Ecuador	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Guyana	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	French Guiana	Dec 2018	French Guiana has scheduled for January 2018 the commissioning of an AMHS (CONSOFT) system. AMHS interconnection foreseen to begin on October 2018.
	Peru	Dec 2017	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.
	Suriname	May 2018	Pending operational tests to be made when Venezuela has implemented its new AMHS system (September 2017) and Suriname has updated its AHMS system (date TBD).
Trinidad & Tobago	Dec 2018	New AMHS system started operations in Venezuela on 20 September 2017. Tests foreseen November 2017.	

**Green highlighted:** AMHS interconnection operative

**Light green:** almost operational

**(AIDC) GROUND-GROUND DATA INTERCONNECTION LEVEL REQUIREMENTS IN THE SAM REGION**

<b>ARGENTINA</b>						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels *				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
CORDOBA (AUT. INDRA AIRCON2100) (2007)	IQUIQUE	XI			X	Positive AIDC tests - March 2016 As a result of the tests, the transmission speed has to be incremented from 2400 to 9600 bit/seg AIDC foreseen to be operational at the end of the second semester of 2018.
	LA PAZ	XI			X	AIDC foreseen for period - 2019
	EZEIZA	XI			XI	AIDC in pre-operational phase since December 2015. Operational phase foreseen by the first semester of 2017
	MENDOZA	XI			X	AIDC pre-operational phase by the second semester of 2017
	RESISTENCIA	XI			X	AIDC pre-operational phase by the second semester of 2017
RESISTENCIA (AUT. INDRA AIRCON2100) (May 2016)	ASUNCION	XI			X	Positive AIDC tests were conducted in 2015 between Ezeiza and Asuncion. Tests between Resistencia and Asuncion were conducted in the end of 2016. AIDC foreseen to be operational by the first semester of 2018.
	CORDOBA	XI			X	AIDC pre-operational by the second semester of 2017
	CURITIBA	XI			X	AIDC foreseen by the first semester of 2018
	EZEIZA	XI			X	AIDC pre-operational by the second semester of 2017
	MONTEVIDEO	XI			X	AIDC foreseen by the first semester of 2018
EZEIZA (AUT. INDRA	COMODORO RIVADAVIA	XI			X	AIDC pre-operational by the second semester of 2017

AIRCON2100) (2007)	MENDOZA	XI			X	AIDC pre-operational by the second semester of 2017
	PUERTO MONTT	XI			X	AIDC by the first semester of 2018
	CORDOBA	XI			XI	AIDC in pre-operational phase since December 2015. Operational phase foreseen by the second semester of 2017
	RESISTENCIA	XI			X	AIDC pre-operational by the second semester of 2017
	JOHANNESBURG	XI			X	AIDC tests foreseen by the second semester of 2017
	MONTEVIDEO	XI			X	AIDC foreseen by the first semester of 2018
MENDOZA (AUT INDRA AIRCON2100) (May 2016)	EZEIZA	XI			X	AIDC pre-operational by the first semester of 2017
	SANTIAGO	XI			X	AIDC foreseen for period 2018-2019
	CORDOBA	XI			X	AIDC pre-operational by the second semester of 2017
COMODORO RIVADAVIA (AUT INDRA AIRCON2100) (June 2016)	EZEIZA	XI			X	AIDC pre-operational by the first semester of 2017
	PUNTA ARENAS	XI			X	AIDC by the end of the second semester of 2017
	PUERTO MONTT	XI			X	AIDC by the end of the second semester of 2017

BRAZIL						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
AMAZÓNICO (MANAUS) AUTO. SAGITARIO ATECH	BRASILIA	XI			XI	AIDC implemented June 2016
	BOGOTÁ	XI			X	AIDC operational foreseen by first semester 2018
	CAYENNE	XI			X	AIDC foreseen for period 2018-2019
	CURITIBA	XI			XI	AIDC implemented July 2016
	GEORGETOWN	XI			X	AIDC foreseen for period 2018-2019
	LA PAZ	XI			X	AIDC foreseen for period 2019
	LIMA	XI			X	AIDC foreseen first semester 2018

	MAIQUETIA	XI	X		X	AIDC foreseen for period 2018-2019
	PARAMARIBO	XI			X	AIDC foreseen for period 2018-2019
	RECIFE	XI			X	AIDC implemented since 2 May 2016
	ATLÂNTICO	XI			X	Second semester 2017
BRASILIA AUTO. SAGITARIO ATECH	AMAZÔNICO	XI			XI	AIDC implemented June 2016
	CURITIBA	XI			XI	AIDC implemented July 2016
	RECIFE	XI			XI	AIDC implemented June 2016
CURITIBA AUTO. SAGITARIO ATECH	AMAZONICO	XI			XI	AIDC implemented July 2016
	ASUNCION	XI			X	AIDC foreseen second semester 2018
	BRASÍLIA	XI			Xi	AIDC implemented July 2016
	LA PAZ	XI			X	AIDC foreseen for period 2018-2019
	MONTEVIDEO	XI			X	AIDC foreseen for the first semester of 2018
	RECIFE	XI			XI	AIDC implemented July 2016
	RESISTÊNCIA	XI			X	AIDC foreseen by the first semester of 2018
	ATLÂNTICO	XI			X	Second Semester 2017
RECIFE AUTO. SAGITARIO ATECH	AMAZÔNICO	XI			XI	AIDC Implemented on 2 May 2016
	BRASÍLIA	XI			XI	AIDC implemented June 2016
	CURITIBA	XI			XI	AIDC implemented July 2016
	ATLÂNTICO	XI			X	Second Semester 2017
ATLÂNTICO AUTO. SAGITARIO ATECH	AMAZÔNICO	XI			X	Second Semester 2017
	CURITIBA	XI			X	Second Semester 2017
	DAKAR	XI			X	AIDC TBD
	JOHANNESBURG	XI			X	AIDC TBD
	LUANDA	XI			X	AIDC TBD
	MONTEVIDEO	XI			X	AIDC foreseen for period 2018-2019
	RECIFE	XI			X	Second Semester 2017
	CAYENNE	XI			X	AIDC foreseen for period 2018-2019

<b>BOLIVIA</b>						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
LA PAZ (MANUAL)	AMAZÓNICO	XI			X	AIDC foreseen for period 2019
	ASUNCION	XI			X	AIDC foreseen for period 2019
	CURITIBA	XI			X	AIDC foreseen for period 2019
	CORDOBA	XI			X	AIDC foreseen for period 2019
	LIMA	XI			X	AIDC foreseen for period 2019
	IQUIQUE	XI			X	AIDC foreseen for period 2019

<b>CHILE</b>						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
SANTIAGO (AUTO THALES TOPSKY)	IQUIQUE	XI			X	AIDC foreseen for period 2018-2019
	LIMA	XI			X	AIDC foreseen for period 2018-2019
	MENDOZA	XI			X	AIDC foreseen for period 2018-2019
	PUERTO MONTT	XI			X	AIDC foreseen for period 2018-2019
IQUIQUE (AUTO INDRA AIRCON 2100)	CORDOBA	XI			X	Positive AIDC tests - March 2016. Tests results indicate the requirement of increase transmission speed from 2400 to 9600 bit/sec. AIDC operational foreseen by the first semester of 2018
	LA PAZ	XI			X	AIDC foreseen for period 2018-2019
	LIMA	XI			X	Positive AIDC tests conducted in February 2016. AIDC foreseen to be operational by the second semester of 2017
PUERTO MONTT (INDRA AUTOMATED)	SANTIAGO	XI			X	AIDC foreseen for period 2018-2019
	PUNTA ARENAS	XI			X	AIDC pre operational since November 2016.
	EZEIZA	XI			X	AIDC by the first semester of 2018
	COMODORO RIVADAVIA	XI			X	AIDC by the first semester of 2018

PUNTA ARENAS (INDRA AUTOMATED)	PUERTO MONTT	XI			X	AIDC pre operational since November 2016
	COMODORO RIVADAVIA	XI			X	AIDC by the first semester of 2018

COLOMBIA						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 444 4 Man ual	2 444 4 Aut o	3 (OLDI)	4 (AIDC )	
BOGOTÁ (AUTO INDRA AIRCON 2100)	AMAZÔNICO	XI			X	AIDC operational foreseen first semester 2018
	CENAMER	XI			X	AIDC foreseen for period 2018- 2019
	GUAYAQUIL	XI			XI	Positive AIDC tests conducted AIDC in pre-operational phase (August 2015). Implementation foreseen December 2017.
	LIMA	XI			XI	Positive AIDC tests conducted. AIDC pre-operational (August 2015) Operational letter of agreement incorporating AIDC was signed on November 2016 Operational phase foreseen last quarter 2017
	MAIQUETIA	XI			X	AIDC foreseen for period 2018- 2019
	PANAMA	XI			X	Positive AIDC tests conducted. AIDC foreseen to be operational by first semester 2018.
	BARRANQUILLA	XI			XI	AIDC pre-operational (March 2016)
BARRANQUILLA (AUTO INDRA AIRCON 2100)	MAIQUETIA	XI			X	AIDC foreseen for period 2018- 2019
	PANAMA	XI			X	Positive AIDC tests conducted. AIDC foreseen to be operational by first semester 2018.
	BOGOTA	XI			XI	AIDC pre-operational (March 2016)
	KINGSTON	XI			X	AIDC TBD
	CURAAO	XI			X	AIDC TBD
APP Rio Negro (AIRCON 2100)	PANAMA	XI			X	Tests on first semester 2018
APP Cali (AIRCON 2100)	PANAMA	XI			X	Tests on first semester 2018

ECUADOR						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 444 4 Auto	3 (OLDI)	4 (AIDC )	
GUAYAQUIL AUTO INDRA AIRCON 2100	BOGOTA	XI			XI	Positive AIDC tests conducted. AIDC pre-operational (August 2015) implementation foreseen December 2017
	LIMA				XI	AIDC operational implementation (31 March 2016) Migrated to pre-operational phase since Nov 2016. Resume to operational phase foreseen for last quarter 2017.
	CENAMER	XI			X	Positive AIDC tests conducted. AIDC foreseen for period 2018-2019

FRENCH GUIANA						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
CAYENNE AUTO ADACEL AIDC not installed	AMAZÓNICO	XI			X	AIDC foreseen for period 2018-2019
	PARAMARIBO	XI			X	AIDC foreseen for period 2017-2019
	PIARCO	XI			X	AIDC foreseen for period 2018-2019
	DAKAR	XI			X	AIDC foreseen for period 2018-2019
	ATLANTICO	XI			X	AIDC foreseen for period 2018-2019

GUYANA						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC )	
GEORGETOWN AUTO INTELCAN AIDC not installed	AMAZONICO	XI			X	AIDC foreseen for period 2018-2019
	PIARCO	XI			X	AIDC foreseen for period 2018-2019
	MAIQUETIA	XI			X	AIDC foreseen for period 2018-2019
	PARAMARIBO	XI			X	AIDC foreseen for period 2018-2019

PANAMA						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 444 Auto	3 (OLDI)	4 (AIDC )	
PANAMA (AUTO THALES)	BOGOTA	XI			X	Positive AIDC tests conducted. AIDC foreseen to be operational by first semester 2018.
	BARRANQUILLA	XI			X	Positive AIDC tests conducted. AIDC foreseen to be operational by first semester 2018.
	CENAMER	XI			X	Positive AIDC tests conducted. Pre operational phase. AIDC foreseen to be operational by first semester 2018.
	APP CALI	XI			X	Tests on first semester 2018.
	APP RIO NEGRO	XI			X	Tests on first semester 2018.
	KINGSTON	XI			X	Pre-operational phase by first semester 2018

PARAGUAY						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
ASUNCION AUTO AIRCON 2100 INDRA	CURITIBA	XI			X	AIDC foreseen for second semester 2018
	LA PAZ	XI			X	AIDC foreseen for period 2018-2019
	RESISTENCIA	XI			X	Positive AIDC tests conducted in 2015 between Ezeiza and Asuncion. Tests between Resistencia and Asuncion were held by the end of 2016. AIDC foreseen to be operational by the first semester 2018.

PERU						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
LIMA AUTO AIRCON 2100 INDRA	AMAZONICO	XI			X	AIDC foreseen to be operational by first semester 2018
	BOGOTA	XI			XI	Positive AIDC tests conducted. AIDC pre-operational phase (August 2015). Amendment to the operational agreement including the AIDC signed in November 2016. Operational phase foreseen last quarter 2017
	SANTIAGO	XI			X	AIDC foreseen for period 2018-2019
	IQUIQUE	XI			X	Positive AIDC tests conducted in February 2016. AIDC foreseen to be operational by the second semester of 2017.

	GUAYAQUIL	XI			XI	AIDC operational (31 March 2016) migrated to pre-operational phase on November 2016. Expected to resume operational phase the las quarter 2017.
	LA PAZ	XI			X	AIDC foreseen for period 2019

SURINAME						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
PARAMARIBO (AUTO INTELSCAN)  AIDC not installed	AMAZÓNICO	XI			X	AIDC foreseen for period 2018-2019
	GEORGETOWN	XI			X	AIDC foreseen for period 2018-2019
	PIARCO	XI			X	AIDC foreseen for period 2018-2019
	CAYENNE	XI			X	AIDC foreseen for period 2018-2019

URUGUAY						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
MONTEVIDEO (AUTO INDRA AIRCON2100)	CURITIBA	XI			X	AIDC foreseen by first semester 2018
	EZEIZA	XI			X	AIDC foreseen by the first semester 2018
	RESISTENCIA	XI			X	AIDC foreseen by first semester 2018
	ATLANTICO	XI			X	AIDC foreseen for period 2018-2019
	JOHANNESBURG	X			X	AIDC TBD

VENEZUELA						
ACC	ACC ADJ	Flight plan				Comments
		Interconnection levels				
		1 4444 Manual	2 4444 Auto	3 (OLDI)	4 (AIDC)	
MAIQUETIA (AUTO ATECH X4000) AIDC not installed	AMAZONICO	XI	XI		X	AIDC foreseen for period 2018-2019
	BOGOTA	XI			X	AIDC foreseen for period 2018-2019
	BARRANQUILLA	XI			X	AIDC foreseen for period 2018-2019
	PIARCO	XI			X	AIDC TBD
	CAYENNE	XI			X	AIDC foreseen for period 2018-2019
	CURAZAO	XI			X	AIDC TBD
	SAN JUAN	XI			X	AIDC TBD

\* X **PLANNED**

\*XI **IMPLEMENTED AND IN PRE-OPERATIONAL OR OPERATIONAL PHASE**

**IMPLEMENTATION OF DOMESTIC IP NETWORKS /  
IMPLANTACION DE REDES IP NACIONALES**

<b>STATE/ESTADO</b>	<b>IP APPLICATIONS IMPLEMENTED/ APLICACIONES IP IMPLANTADAS</b>	<b>IMPLEMENTATION DATE OF DOMESTIC IP NETWORK FOR ALL IP APPLICATIONS/ FECHA DE IMPLANTACION DE RED IP NACIONAL PARA TODAS LAS APLICACIONES EN IP</b>
Argentina	AMHS, DATA RADAR, IP VOICE/VOZ IP	2005
Bolivia	AMHS	2016
Brazil/Brasil	AMHS, DATA RADAR, IP VOICE/VOZ IP	2015
Chile	AMHS	2015
Colombia	AMHS, RADAR	2016
Ecuador	AMHS, RADAR	2014
French Guiana (France) / Guyana Francesa (Francia)	No	2018
Guyana	AMHS	2018
Panamá	AMHS, RADAR	2016
Paraguay	AMHS	2014
Perú	AMHS, RADAR	2016
Suriname/Surinam	AMHS	2018
Uruguay	AMHS RADAR	2014
Venezuela	AMHS	2010

Green = Implemented

Verde = Implantada

**Agenda Item 5: Follow-up on the resolution of air navigation deficiencies in the CAR/SAM Regions**

Under this agenda item, the following working paper was discussed:

- WP/16 (Secretariat)

**5. “A”, “B” and “U” Deficiencies in the CAR/SAM Regions**

5.1 The Meeting analyzed the follow-ups made to the resolution of the deficiencies in the air navigation services for the CAR/SAM Regions, taking into account the progress in their solution/mitigation:

- In the CAR Region, under the NACC “No Country Left Behind” (NCLB) strategy, a review of the deficiencies was made, particularly those of “U” priority. The follow-up is made based on the personalized NCLB action plans for each State and with this strategy an annual significant reduction (resolution) has been achieved since its implementation in 2016 (300% of resolution increase rate compared with 2014).
- In the SAM Region, work is done with States in order to resolve the deficiencies that remained for many years in the GANDD. After GREPECAS/17, “U” priority deficiencies decreased by 50%, through the coordinated work of the States, during the last three years.

5.2 Following PPRC/3-1 Decision and PPRC/4 Conclusion 4/1, teleconferences have been carried out, one in 2016 and one in 2017, with IATA and IFALPA to address the deficiencies reported by their partners in the States. Following C/CRPP/4-2, the Secretariat requested from States, the status and progress regarding the resolution of deficiencies in the MET area related to personnel. Bolivia reported that the deficiency was resolved and provided the corresponding documentation.

## **Agenda Item 6            Matters related to the organisation of GREPECAS**

Under this agenda item, the following working papers were presented:

- WP/26 (Secretariat), WP/34 (Secretariat), WP/17 (Secretariat)

### **Standard Project Methodology for RASG-PA and GREPECAS**

6.1            The Secretariat informed the Meeting that, after working for seven years applying a project-based approach, opportunities for improvement have been identified on several aspects, *inter alia*: document control, reports, participation of stakeholders and communication with States, interfaces with RASG-PA, performance indicators, etc. The Meeting also noted that the RASG-PA procedural handbook stated that the Executive Steering Committee (ESC) could establish working groups/committees, as required, in order to support research, to conduct and prioritise RASG-PA activities. These working groups/committees would report to the ESC and the duration of their duties would be established by the ESC.

6.2            During the discussions, the Meeting stressed repeatedly the need for better coordination between the two Regions of efforts and projects, as well as the need for better communication to the States regarding implementation developments and challenges. The Secretariat indicated that these concerns could be addressed through effective application of a proven and recognised project management methodology. Accordingly, the Secretariat welcomed the recommendation for the two groups (RASG-PA and GREPECAS) to implement commonly accepted project management approach (based on PMI, PRINCE, etc.). Therefore, the Secretariat was requested to analyse available project management (PM) approach options to be submitted for approval to the ESC and GREPECAS.

### **Rotation of the GREPECAS Secretariat**

6.3            The Meeting took note of paragraph 3.3.4.1 of the ICAO Regional Office Manual, stipulating that the senior ICAO Regional Director should be the PIRG Secretary when two or more Regions were involved.

6.4            In this regard, noting that **Mr. Melvin Cintron**, current Director of the NACC Regional Office, had been designated to that position in January 2015, and that, with the retirement of Mr. Franklin Hoyer as Director of the SAM Regional Office and subsequent designation to that position of **Mr. Fabio Rahnemay Rabbani**, who took over in February 2018, the Meeting considered that the Director of the NACC Regional Office should assume the GREPECAS Secretariat.

### **Modification of the GREPECAS Procedural Handbook**

6.5            The Meeting also noted that paragraph 3.3.4.1 of the ROM, together with paragraph 5.1 of the RASG-PA Procedural Handbook, implicitly stated that the Secretariat of GREPECAS and RASG-PA should be subject to rotation. However, this was not explicitly indicated in the GREPECAS Procedural Handbook.



**Agenda Item 7: Other business**

Under this agenda item, the following working and information papers were discussed:

- WP/18 (Secretariat), WP/22 (IATA), WP/24 (CARSAMMA), WP/27 (CARSAMMA), WP/30 (IATA), IP/04 (IATA), IP/05 (United States), IP/06 (United States), IP/09 (Dominican Republic), IP/10 (Dominican Republic), IP/21 (Dominican Republic)

**Follow up on the results of the GREPECAS Scrutiny Group (GTE)**

7.1 The Meeting took note of the GTE report, which showed that RVSM airspace operations remained within the acceptable level of safety. **Appendix A** to this part of the report shows CRM assessment results for the period 2012-2016.

7.2 The analysis of reported LHDs revealed that 94% of events were still attributable to coordination errors between adjacent ATC units. Although an average 13% downward trend was observed in the last two years, it was estimated that concrete actions were required from States/international organisations to definitively mitigate these occurrences. Measures such as AIDC implementation and RADAR data exchange had proven effective.

7.3 Other concerns mentioned in the report were the duplication of flight plans; the delay by some States/international organisations in sending LHD reports and data on RVSM airspace operations; and POC turnover. Similarly, the number of State aircraft operating in RVSM airspace without the proper RVSM designation in their flight plan, and the operation of non-RVSM aircraft constituted a latent hazard that required mitigation.

7.4 In view of the foregoing, and in order to continuous improve the analysis of CAR/SAM LHDs, the GTE/17 formulated Conclusion GTE/17-3 on training for focal points. The Meeting took note of the report submitted and agreed on the following conclusion:

<b>CONCLUSION GREPECAS 18/21</b>		<b>SUPPORT TO GTE AND CARSAMMA ACTIVITIES TO IMPROVE THE ANALYSIS OF INFORMATION ON DEVIATIONS IN RVSM AIRSPACE</b>
<p><b>That,</b></p> <p>Following actions be carried out in order to improve the analysis of information on deviations in RVSM airspace:</p> <p>a) States/international organisations and CARSAMMA, in coordination with ICAO Regional Offices, carry out activities to improve the reception and processing of information on deviations in RVSM airspace;</p>	<p><b>Expected impact:</b></p> <p><input type="checkbox"/> Political / Global</p> <p><input checked="" type="checkbox"/> Inter-regional</p> <p><input type="checkbox"/> Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Operational/Technical</p>	

<p>b) CARSAMMA and the GTE exchange information and closely coordinate with the implementation groups coordinated by ICAO Regional Offices, in order to strengthen implementation activities that will help reduce LHD occurrences in CAR/SAM FIRs;</p> <p>c) States/international organisations, in coordination with CARSAMMA and ICAO Regional Offices, take the necessary measures to avoid the operation of non-RVSM aircraft, and coordinate with the relevant parties for proper flight plan completion for the operation of State aircraft in RVSM airspace; and</p> <p>d) GTE submit the plans for the aforementioned activities and their status of implementation at the PPRC/5 meeting.</p>	
<p><b>Why:</b> Improve the process of analysis of information on deviations in RVSM airspace</p>	
<p><b>When</b> PPRC/5 Meeting</p>	<p><b>Estado:</b> Adopted by GREPECAS/18</p>
<p><b>Quién:</b> <input type="checkbox"/> Coordinators <input checked="" type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> Otros: CARSAMMA, GTE, Organizaciones Intl.</p>	

7.5 Dominican Republic informed the Meeting about mitigation action taken to resolve LHD occurrences in the Santo Domingo FIR. In this regard, mitigation measures included doubling and tripling oversight responsibilities, making it more effective during the hours identified as having the largest number of LHD occurrences. This single action has had the greatest impact in reducing occurrences. Likewise, training and awareness campaigns for our ATC personnel have been carried out, so that they can be more alert and can easily identify and correct possible errors before they become an operational deviation or an LHD event.

#### **Amendment of CARSAMMA terms of reference and approval of guidance manual**

7.6 The Meeting took note that the last meeting of the GTE had formulated Conclusion GTE/17-2, requesting CARSAMMA to assess lateral and longitudinal deviations reported by the POCs of the States/international organisations, since they were an important source of data to be used for analysing and improving safety levels in CAR/SAM airspace. For CARSAMMA to conduct such analysis, it was necessary to review the terms of reference of CARSAMMA in order to extend the scope of the RMA. Accordingly, a proposal of amendment to the terms of reference of CARSAMMA (**Appendix B** to the report) was presented to the Meeting, which went on to its approval.

7.7 The Meeting took note that the last meeting of the GTE addressed, once again, the need for POCs to use the Guidance Manual throughout the LHD data collection and analysis process. The Meeting approved the proposal.

7.8 In view of the above, the Meeting adopted the following conclusion:

<b>CONCLUSION GREPECAS 18/22</b>		<b>APPROVAL OF THE AMENDMENT TO CARSAMMA TERMS OF REFERENCE AND OF THE GUIDANCE MANUAL FOR POINTS OF CONTACT (POC)</b>	
<b>What:</b>		<b>Expected impact:</b>	
<p>That, taking into account that safety in CAR/SAM airspace is a priority for ICAO, the States/international organisations, CARSAMMA, and all stakeholders:</p> <p>a) approve the amendment to the Terms of Reference (ToRs) to include the processing of lateral and longitudinal deviations within the scope of CARSAMMA. To this end, CARSAMMA shall prepare a project to be submitted to the GTE/18 meeting for the inclusion of the safety assessment of horizontal deviations, including the method of analysis, the collision risk model to be used, the establishment of a target level of safety, and the guidance material to be used by points of contact (POC);</p> <p>b) approve the Guidance Manual for Points of Contact (POCs) accredited to CARSAMMA; and</p> <p>c) request Brazil/DECEA to provide the necessary support to allow CARSAMMA fulfil its new responsibilities derived from the amendment of the TORs.</p>		<p><input type="checkbox"/> Political / Global</p> <p><input checked="" type="checkbox"/> Inter-regional</p> <p><input type="checkbox"/> Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Operational/Technical</p>	
<b>Why:</b>			
To review the terms of reference of CARSAMMA to include within the RMA scope the processing of lateral and longitudinal deviations.			
<b>When:</b> GTE/18 Meeting		<b>Status:</b> Adoptada por GREPECAS/18	
<b>Who:</b> <input type="checkbox"/> Coordinators <input type="checkbox"/> States <input checked="" type="checkbox"/> ICAO Secretariat <input type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> Others: CARSAMMA, GTE			

### **Application of ICAO's policies on charges for airports and air navigation services contained in Doc 9082**

7.9 The Meeting took note of the description provided by IATA of the status of implementation of ICAO's policies on charges in the Americas and the level of awareness of such policies. It also highlighted the benefits of implementing the policies, principles, and provisions of Doc 9082 and proposed that it become an implementation priority for the period 2017-2020. In this sense, the Meeting encouraged States to comply with ICAO's policies on charges set forth in Doc 9082 and to incorporate the four key principles of non-discrimination, cost-benefit ratio, transparency, and consultation with users, in national legislation, regulations or policies in order to ensure compliance by airport operators and air navigation service providers.

### **Promotion of sustainable airport management/Safety Strategy of the Americas**

7.10 The Meeting took note of the deficiencies observed by IATA at airports privatised in the CAR/SAM Regions, and made recommendations on how to avoid these deficiencies, regardless of an airport's management structure, and proposed that it become a priority for adoption during the period 2018-2020. In this regard, the Meeting encouraged States to define a long-term vision for airports, including connectivity, social impact, economic impact, etc. and to make sure that airlines, as key stakeholders, participate from the beginning in any foreseen property development of airport management; develop sound, robust, independent and effective economic regulations, regardless of the airport management structure or any attempt to modify it.

7.11 IATA provided the Meeting with an update on the Safety Strategy of the Americas and the activities of the Safety Approach Group.

### **Runway Safety Programme following SMS principles and SMS implementation**

7.12 The Federal Aviation Administration (FAA) informed the Meeting that it was conducting a national runway safety programme, applying safety management system (SMS) principles. The FAA programme brought together airports and partners of the industry to collaborate in the use of data and risk-based decision-making to improve airspace safety in the United States.

7.13 The Dominican Republic informed the Meeting about the implementation of the air navigation service provider's SMS pursuant to ICAO Annex 19 and the Dominican Aeronautical Regulation 110 (RAD-110, Safety Management System). It was noted that SMS implementation and the fact that the SMS had met and exceeded national and international requirements and standards, as shown by audit results, had enabled them to ensure safety in their flight information region. It was also noted that the State made available to interested States the experience gained in this process, the support of their personnel that participated in the implementation, as well as SSP and SMS training by their *Academia Superior de Ciencias Aeronáuticas* (ASCA).

### **UAS integration pilot programme**

7.14 The United States informed the Meeting about the establishment of the UAS Integration Pilot Program (IPP), an initiative that would allow for the safe testing and validation of advanced UAS operations. This programme would help tackle the most significant challenges in integrating UAS into the U.S. national airspace, and would evaluate a variety of operational concepts, including night operations, flights over people, flights beyond the pilot's line of sight, package delivery, detect-and-avoid technologies, counter-UAS security operations, and the reliability and security of data links between pilot and aircraft.

## CAPSCA

7.15 The Dominican Republic informed about the activities being carried out regarding the *Cooperation agreement to prevent spread of communicable diseases by air transport (CAPSCA)*. They also noted that, in order to ensure effective training of personnel in charge of each of the disciplines involved in CAPSCA activities, the *Instituto Dominicano de Aviación Civil (IDAC)*, through ASCA, had started to develop a standardised set of learning material using the TRAINAIR PLUS methodology, aimed at providing aviation professionals proper training on the subject. The Meeting took note that said training was available to any State that so required.

## Election of the GREPECAS Chairperson and Vice-Chairperson

7.16 Taking into account that Mr. Normando Araujo de Medeiros had resigned as Chairman of GREPECAS at the PPRC/4 meeting, the Secretariat requested the delegates to nominate candidates for GREPECAS Chairperson and Vice-Chairperson, following the criteria established in paragraph 4.7 of the Procedural Handbook. In this regard, Cuba proposed **Mr. Santiago Rosa**, delegate of the Dominican Republic, as Chairman of GREPECAS, which was widely supported by the members of GREPECAS. For the position of Vice-Chairperson, Paraguay reminded the Meeting of the ample experience of **Mr. Ary Rodrigues Bertolino**, delegate of Brazil, and nominated him as Vice-Chairman of GREPECAS. The Meeting also supported this motion.

## Next PPRC/5 and GREPECAS/19 Meetings

7.17 The Secretariat reminded the Meeting that the next meeting would be the PPRC/5, scheduled for mid 2019 at NACC Regional Office in Mexico. Taking into account the frequency of GREPECAS plenary meetings, to be held every three years immediately after the ICAO Assembly Session, and recognising that GREPECAS/18 could not be held the previous year, the Meeting agreed to carry out the GREPECAS/19 meeting in mid 2020, in a SAM State. States were invited to offer to host the GREPECAS/19 meeting while ICAO will start coordination with potential host States.

**APPENDIX A****Table of results of CRM assessment - 2012-2016**

<b>Year</b>	<b>Technical risk</b>	<b>TLS</b>	<b>Operational risk</b>	<b>TLS</b>	<b>Total risk</b>	<b>TLS</b>	<b>Result</b>
2012	$7,48 \times 10^{-12}$	$2.5 \times 10^{-9}$	$3.38 \times 10^{-9}$	----	$3,39 \times 10^{-9}$	$5.0 \times 10^{-9}$	Below
2013	$9.10 \times 10^{-12}$	$2.5 \times 10^{-9}$	$1.17 \times 10^{-8}$	----	$1.18 \times 10^{-8}$	$5.0 \times 10^{-9}$	Above
2014	$0,0508 \times 10^{-9}$	$2.5 \times 10^{-9}$	$1.80 \times 10$	----	$1.85 \times 10^{-9}$	$5.0 \times 10^{-9}$	Below
2015	$2.46 \times 10^{-11}$	$2.5 \times 10^{-9}$	$1.27 \times 10^{-9}$	----	$1.29 \times 10^{-9}$	$5.0 \times 10^{-9}$	Below
2016	$0.0261 \times 10^{-9}$	$2.5 \times 10^{-9}$	$1.1956 \times 10^{-9}$	----	$1.2203 \times 10^{-9}$	$5.0 \times 10^{-9}$	Below
2017		$2.5 \times 10^{-9}$		----		$5.0 \times 10^{-9}$	



# GUIDANCE MANUAL FOR POINTS OF CONTACT (POC) ACCREDITED TO CARSAMMA

First Edition - 2018





## Table of Contents

	Page
<b>Table of Contents.....</b>	<b>3</b>
<b>Chapter 1 Introduction .....</b>	<b>5</b>
1.1 Background .....	5
1.2 Purpose of the Manual.....	5
1.3 Scope.....	5
1.4 List of Acronyms.....	7
<b>Chapter 2 Guidance for Points of Contact (PoC) Accredited to CARSAMMA .....</b>	<b>8</b>
2.1 Filling and Submission of Forms.....	8
2.2 Forms.....	8
2.2.5 CAR/SAM Regions Points of Contact Form (F1).....	8
2.2.6 RVSM Approval Registry Form (F2).....	9
2.2.7.....	9
Cancelation of the RVSM Approval Form (F3).....	9
2.2.8.....	9
Large Height Deviation Form .....	9
(F4).....	9
2.3 Flow of Data.....	9
2.4 Responsibilities of the States and International Organizations Points of Contact (POC) 10	10
2.5 Responsibilities of CARSAMMA Assigned by GREPECAS.....	11
<b>Chapter 3 Guide to the Evaluation of Large Height Deviations (LHDs) based on a Safety Management System (SMS) .....</b>	<b>12</b>
3.1 Scope .....	12
3.2 Analysis and Evaluation of LHDs .....	12
3.3 Risk Value Calculation.....	14
3.4 Target Level of Safety (TLS) .....	15
<b>Chapter 4 Terms of Reference .....</b>	<b>16</b>
4.1 Introduction .....	16
4.1.2 Terms of Reference of the GTE .....	16
4.1.3 Composition: .....	16
4.2 CARSAMMA Terms of Reference (ToR) .....	16

<b>Chapter 5 Reference Guide for Validation of LHD events .....</b>	<b>18</b>
5.1. Introduction .....	18
5.2 System Performance Monitoring .....	18
.....	18
5.3 Identifying Large Height Deviations .....	19
5.4 Parameter Values .....	19
5.5 Event Category .....	23
5.6 Identify trends .....	24
<b>Chapter 6 Training Programme for POC to the CAR/SAM Monitoring Agency</b>	
<b>CARSAMMA .....</b>	<b>26</b>
6.1 General Purpose: .....	26
Specific objectives: .....	26
6.2 Lessons Plan .....	26
Appendix A .....	28
CARSAMMA F0 Form – Aircraft Movements .....	28
Appendix B .....	30
CARSAMMA F1 – Point of Contact .....	30
Appendix C .....	31
CARSAMMA F2 – RVSM Approval .....	31
Appendix D .....	33
CARSAMMA F3 – RVSM Withdrawal .....	33
Appendix E .....	35
CARSAMMA F4 – Large Height Deviation .....	35
Appendix F .....	38
Flowchart of the process of reporting and validation of the LHD .....	38
Appendix G .....	39
Flowchart of the CRM Analysis Process of the LHD .....	39
Appendix H .....	40
Precision of SSR Data Mode C .....	40
Appendix I .....	41
Functional duties of the contact points of the Fir's CAR/SAM .....	41
Introduction .....	41
Appendix J .....	42
<b>REFERENCE DOCUMENTS</b> .....	<b>42</b>
List of reference documents .....	42

## Chapter 1

### Introduction

#### 1.1 Background

- 1.1.1 In 1982, coordinated by ICAO's Review of the General Concept of Separation Panel (RGCSP), some countries initiated programs to comprehensively study the issue of vertical separation minimum (VSM) reduction above FL290. In December 1988, the results of these studies were considered by the RGCSP at its sixth meeting (RGCSP/6). After exhaustive studies using quantitative risk assessment methods to support operational decisions regarding the feasibility of reducing the VSM, the level of risk considered acceptable was named the Target Level of Safety (TLS). At the seventh meeting of the RGCSP in November 1990, the Panel concluded the global guidance material for the implementation of RVSM.
- 1.1.2 The main objective of the document "Manual on a 300 m (1,000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive" of ICAO (Doc 9574) is to provide the criteria, requirements and methodology for the Regional Planning Group (RPG) planning groups for the development of documents, procedures and programs to facilitate the introduction of RVSM in their regions.
- 1.1.3 CARSAMMA was established by the 10th meeting of GREPECAS held in Manaus in 2002. Brazil assumed the responsibility of providing the means for the functioning of the Agency monitoring the CAR/SAM regions' RVSM airspace and as a repository of a data base of RVSM/PBN certified aircraft by the civil aviation authorities of the States of the regions. This Agency is located in Rio de Janeiro, having as its scope, the whole region of the Caribbean and South America, which comprises a total of 34 FIRs, including 21 States, with the exception of Mexico.
- 1.1.4 Derived from the CARSAMMA assignments, there is a need for collection of data for the study of the level of risk of the airspace under its jurisdiction. The level of risk considered acceptable was named "Target Level of Safety" (TLS), which is expressed as  $5 \times 10^{-9}$  fatal accidents per flight hour in the RVSM airspace.

#### 1.2 Purpose of the Manual

- 1.2.1 Establish the procedures to be applied by the Points of Contact (PoCs) of the CAR/SAM States, responsible for coordinating the filling of the forms used by CARSAMMA for RVSM airspace monitoring, as well as urging that the CAAs fill and send the forms related to the "status" of RVSM approval of aircraft to CARSAMMA. This manual also serves as a guide for the PoC for the analysis of the LHD events and their validation.

#### 1.3 Scope

- 1.3. The procedures of this Manual are applied to the PoC of ATC service providers and CAA Members of GREPECAS that coordinate with CARSAMMA.



#### 1.4 List of Acronyms

CAA	Civil Aviation Authority
ACC	Area Control Centre
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Controller
CARSAMMA	Caribbean and South America Monitoring Agency
CRM	Collision Risk Model
FIR	Flight Information Region
FL	Flight Level
GREPECAS	CAR/SAM Regional Planning and Implementation Group
GTE	Scrutiny Working Group
IMC	Instrument Meteorological Conditions
LHD	Large Height Deviation
ICAO	International Civil Aviation Organization
PoC	Point of Contact
RGCS	Review of the General Concept of Separation Panel
RPG	Regional Planning Group
RVSM	Reduced Vertical Separation Minimum
SMS	Safety Management System
TELECON	“Go To Meeting” Teleconferences
TLS	Target Level of Safety
VMC	Visual Meteorological Conditions

## Chapter 2

### Guidance for Points of Contact (PoC) Accredited to CARSAMMA

#### 2.1 Filling and Submission of Forms

- 2.1.1 ATC units that provide services in the RVSM airspace must report the occurrences related to the large height deviations (LHDs) and aircraft movements, since this information serves as an important input for the risk assessment carried out by CARSAMMA.
- 2.1.2 The guidelines for completing these forms are contained within the forms used by CARSAMMA as indicated below. In Attachments F and G we can observe the flow process for the management of LHDs and Collision Risk Calculation and RVSM Operational Approval Record.

#### 2.2 Forms

- 2.2.1 The CARSAMMA forms are the tools used by CARSAMMA and its Focal Points to exchange data and generate the expected products for RVSM airspace monitoring. The forms are available on the CARSAMMA website ([www.carsamma.decea.gov.br](http://www.carsamma.decea.gov.br)).
- 2.2.2 In order to carry out the tasks efficiently, it is necessary for the Focal Points to fill in the Forms, in the appendices, as accurately as possible, following the guidelines of the models presented.

##### Aircraft Movement Form (F0)

- 2.2.3 To analyze the air traffic data in the determination of the parameters of the Vertical Collision Risk Model (CRM), the ATC service providers responsible for the upper airspace will email to CARSAMMA (using [carsamma@decea.gov.br](mailto:carsamma@decea.gov.br)), the information from December 1 to 31 of the movement of aircraft that occurred in its FIR using the form in Annex A. CARSAMMA will request this form in coordination with the GTE and the ICAO North American, Central American and Caribbean (NACC) and SAM Regional Offices.
- 2.2.4 The period that will be published will always coincide with the movement of the month of December. The ATC Service Providers, responsible for the upper airspace, must send the extracts of the air Movement to CARSAMMA before February 15 of the following year. If necessary, CARSAMMA may request the air movement in another period, prior coordination with PCs of the CAR / SAM States.

#### 2.2.5 CAR/SAM Regions Points of Contact Form (F1)

States will notify CARSAMMA of the information regarding the Points of Contact (PoCs) of the CAR/SAM Regions using the form in Appendix B.

## 2.2.6 RVSM Approval Registry Form (F2).

In order to maintain a registry of the RVSM approval of the aircraft operating in the RVSM airspace of the CAR/SAM Regions, it is necessary that CARSAMMA receives the information from the relevant CAA using Form F2 of Appendix C.

## 2.2.7 Cancellation of the RVSM Approval Form (F3)

CAAs shall send to CARSAMMA, information regarding the cancellation of the RVSM approval by filling in Form F3, Appendix D.

CAA shall send forms F2 and F3 immediately or within the 5 following days after the RVSM approval is issued or cancelled, accordingly, to maintain the updated registry of RVSM approved aircraft.

## 2.2.8 Large Height Deviation Form (F4)

During day-to-day operations in the RVSM airspace, air traffic controllers (ATCOs) shall report Large Height Deviations (LHDs) of 300 feet or more, above or below in relation to the aircraft's assigned flight level. For the registration of these occurrences, the LHD Form shall be used (Appendix E) and emailed to CARSAMMA (carsamma@decea.gov.br).

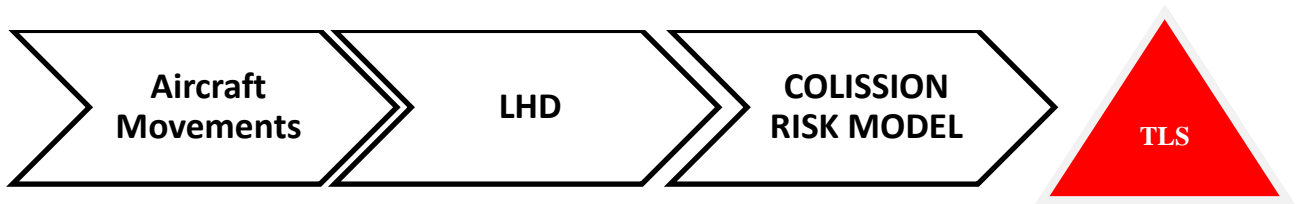
LHD Forms shall be sent to CARSAMMA before the 10th day of the following month of the reported period. CARSAMMA can receive the LHD Forms until the 15th day of the following month of the reported period.

Example: Data from August 01 to 31 shall be completed and sent before September 15 of the same year.

## 2.3 Flow of Data.

2.3.1 The aircraft movement data (F0) will be used in the Vertical CRM calculation and in the verification of RVSM non-approved aircraft operations performed in the RVSM airspace, produced every year.

2.3.2 In the first case of the CRM, after the calculations, the risk is compared with ICAO's TLS, which is  $5 \times 10^{-9}$  fatal accidents per flight hour. This information is presented to the GTE, the ICAO Offices and the GREPECAS.



2.3.3 From the results of the aircraft movement evaluation, CARSAMMA will send ICAO NACC and SAM Regional Offices an annual list of non-RVSM approved aircraft that operated in RVSM airspace, the State of registry and/or of the operator, which are not in CARSAMMA's database.





GTE/14

2.3.4 LHDs (F4), are validated through GTE monthly teleconferences, however, it's been noted that some LHDs submitted by the States or ANSPs are not analyzed and validated internally before submission to CARSAMMA to achieve the desired outcome. Furthermore, sometimes field 21 of Form F4 is not submitted with the required data and information, causing an unnecessary delay of the teleconferences for the analysis and evaluation of LHDs.

2.3.5 Some States and ANSPs report LHDs to CARSAMMA, but lack information regarding the Air Traffic Services (ATS) Unit or CAA involved in the LHD. This hinders CARSAMMA from correlating the LHD report with previous reports for those ATC Units, thereby affecting the proper investigation of the event. This results in CARSAMMA being obligated to complete the process with incomplete data. This impedes the identification of latent conditions by the concerned FIR and hinders the competent authority from taking the appropriate mitigating actions. Taking in to account all the aforementioned situations, for the optimization of the CARSAMMA procedures, the following actions are established:

## **2.4 Responsibilities of the States and International Organizations Points of Contact (POC)**

- a. Provide in coordination with the CAAs and/or ANSPs the training to traffic controllers (ATCOs), supervisors and ATM operational staff in general, in the correct filling of Forms and raise awareness of the importance of the data sent to CARSAMMA; Monitor and guarantee the quality of the data sent to CARSAMMA;
- b) Maintain close contact with the CAA, in order to guarantee the submission of Forms F2 and F3, and solve any doubts regarding the RVSM approval of aircraft and operators; Provide in coordination with CARSAMMA the information to the CAA regarding operators and pilots who falsify the approval status of aircraft;
- c) Periodically verify other means of data gathering for the filling of the LHD Form (especially those that do not have "E" type errors);
- d) Upon receiving the notification from the ATCO of the sector where the LHD occurred, immediately contact his counterpart from the adjacent FIR and provide the relevant information, so that ATS Units are made aware of the occurrence and can begin an analysis process with the data and evidence gathered from both FIRs;
- e) After this, if as a result of the previous analysis, it is observed that the event can be attributed to the aircraft operator, then the information gathered, will be sent as soon as possible to the relevant CAA so that the operator can be notified and can perform the LHD investigation with the pilots involved, using the data of the aircraft systems or their records;
- f) When appropriate, include the IATA representative, as the recipient of notifications made to air operators, so that there is a second means to disseminate information to the appropriate party and achieve effectiveness in the proposed objective;
- g) Maintain a registry with the information of the PoCs of the adjacent FIRs for the information exchange;
- h) Coordinate with the ANSP the corresponding mitigating measures of the validated LHDs that have a risk value higher than 20, and present in the GTE a summary of the adopted mitigating measures.

- i) Send in the established times and the appropriate format the information requested by CARSAMMA including the LHD data and the aircraft movement information.

## **2.5 Responsibilities of CARSAMMA Assigned by GREPECAS**

- A. Maintain a central registry of RVSM approvals for aircrafts and air operators for each State/Territory that uses CAR/SAM RVSM Airspace;
- B. Facilitate the transfer of data to and from other Regional Monitoring Agencies (RMA);
- C. Establish and maintain a data base that contains;
- D. Disseminate timely information for States CAAs on changes regarding monitoring status of aircraft type ratings;
- E. Disseminate the results of monitoring flight using the GPS Global Monitoring System (GMS); Provide means to identify aircraft without RVSM approval operating in the RVSM airspace of the CAR / SAM Regions and notify the facts to the State CAA.; Develop the means to summarize and communicate the content of the relevant databases to the RVSM Scrutiny Group (GTE) for the corresponding safety assessment; y
- F. Perform the collision risk model (CRM) evaluation in the RVSM airspace of the CAR/SAM Regions, according with the ICAO Docs9574 and 9937 Coordinate in advance with the GTE rapporteur the dates of the teleconferences until the first week of the year. The invitation to teleconferences will be made via the "Go To Meeting" tool, ensuring that it is delivered at least one week before the date, to all the POCs involved.
- G. Will present the F4 in the teleconferences, making sure that the sending of the data to be validated is sent in adequate time, for the previous analysis of the participants. After validation in teleconferences, LHDs with a risk value greater than 20 must be sent to the focal points responsible for the FIRs involved, via email, so that the corresponding mitigating measures are taken as soon as possible. The States must present in a Study Note in the following GTE, including a summary of the mitigating measures adopted to mitigate the risk of LHDs with a risk value greater than 20.
- H. Will present for analysis the horizontal deviation events in the RVSM airspace .

### Chapter 3

## Guide to the Evaluation of Large Height Deviations (LHDs) based on a Safety Management System (SMS)

### 3.1 Scope

- 3.1.1 The GTE and CARSAMMA have developed a methodology for the LHD analysis and assessment, based on SMS, aiming to increase the safety level in the RVSM air space of the CAR/SAM Regions.
- 3.1.2 This methodology allows making a risk level assessment of each event in an individual manner and helps to identify the tendencies and the critical points of occurrence.
- 3.1.3 CARSAMMA will continue calculating the risk value using the CRM established in ICAO Doc 9574 - Manual on a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive, taking as reference a TLS of  $5 \times 10^{-9}$  fatal accidents per flight hour. The objective is to make a quantitative (CRM) and a qualitative (SMS) assessment of the operations in the RVSM airspace and increase the safety level in the CAR/SAM regions.
- 3.1.4 The GTE acknowledged the necessity to analyze the LHD using an approach based on SMS, because the collision risk model is carried out through the use of a mathematic formula to calculate the risk level in the Regions without showing a detail of the analyzed events.
- 3.1.5 The GTE has been using the SMS methodology for the analysis and LHD assessment since 2011. This methodology allows States and International Organizations in the CAR/SAM Regions, to analyze the LHDs of its FIRs, adopt and implement the corresponding mitigation measures.

### 3.2 Analysis and Evaluation of LHDs

- 3.2.1 During the analysis, the cause of the event is identified, for which the LHD codes table is used. This table can be found at Appendix B of this manual.
- 3.2.2 After the identification of the causes (LHD code) by CARSAMMA, the GTE must perform the risk analysis associated with each one of the LHD codes identified, assessing the severity and probability of the occurrence.

3.2.3  For the severity analysis, the experience of the GTE	Severity (LHD)
---	----------------

team members is taken into consideration, using the severity table, as follows: Effects					
<b>ATC</b>	<b>Catastrophic 5</b>	<b>Dangerous 4</b>	<b>Major 3</b>	<b>Minor 2</b>	<b>Insignificant 1</b>
	<b>Collision with an aircraft, the terrain or obstacle warning, and TCAS (RA)</b>	<b>Important reduction of the prescribed separation or the total loss of ATC provision (ATC Zero)</b>	<b>Significant reduction of the prescribed separation or ATC capacity</b>	<b>Reduction in the ATC capacity or significant increase of the ATC workload</b>	<b>Minor increase of the ATC workload</b>

Table 1: LHD Severity Table

3.2.4 Each code will have a LHD severity that is associated according to the safety impact: 5	4	3	2	1
J, K	B, D, F, G, H, I	A, C, E2, L	E1	M

Table 2: LHD Codes Table

3.2.5 After determining the severity, the probability is established, based on the statistical data, which shows the points of the highest occurrence index in the CAR/SAM Regions, considering the worst-case scenario. The following table is used for this purpose:

Probability	Level of Services /ATC System	Operational
<b>Frequent 5</b>	Continuously experienced in the system	It is expected to occur each 1-2 days
<b>Occasional 4</b>	It is expected to occur frequently in the system	It is expected to occur several times in a month
<b>Remote</b>	It is expected to occur several times in the	Occur close to once every few months

<b>3</b>	lifetime of the system	
<b>Improbable 2</b>	Unlikely, but can reasonably be expected to occur in the system life cycle	It is expected to occur once every 3 years
<b>Extremely Improbable 1</b>	Unlikely, but possible in the system's life cycle	It is expected to occur at least once each 30 years

Table 3: LHD Probability Table

3.2.6 After the probability is determined, the duration of the event is calculated using the following table:

<b>1 Short</b>	<b>d ≤ 60 seconds</b>
<b>2 Medium</b>	<b>60 seconds &lt; d ≤ 120 seconds</b>
<b>3 Long</b>	<b>d &gt; 121 seconds</b>

Table 1: Event Duration

3.2.7 Accordingly, the following matrix can be used:

<b>Probability (P)</b>	<b>Duration (D)</b>	<b>Severity (G)</b>
<b>5 Frequent</b>		<b>5 Catastrophic</b>
<b>4 Occasional</b>		<b>4 Dangerous</b>
<b>3 Remote</b>	<b>3 Long</b>	<b>3 Major</b>
<b>2 Improbable</b>	<b>2 Medium</b>	<b>2 Minor</b>
<b>1 Extremely Improbable</b>	<b>1 Short</b>	<b>1 Insignificant</b>

Table 2: LHD Risk Matrix

3.2.8 Once the previous values are obtained the GTE Team proceeds to determine if the FIR in risk has or does not have an ATS Surveillance System, if the meteorological conditions were Visual Meteorological Conditions (VMC) or Instrument Meteorological Conditions (IMC) and if there were other air traffic that resulted in a conflict, granting the following values:

<b>Surveillance System</b>	<b>Meteorological Conditions</b>	<b>Other transit</b>
Yes = 5	VMC = 0	With Surveillance 5
No = 10	IMC = 5	Without surveillance 10

Table 3: Values associated with specific parameters

### 3.3 Risk Value Calculation

3.3.1 To calculate the risk value, once the previous data is obtained, the following formula is used:

$$VR = (P \times D \times G) + R + W + T,$$

<b>Parameter</b>	<b>Description</b>	<b>Value</b>
<b>VR</b>	<b>Risk value</b>	<b>To be calculated</b>
<b>P</b>	<b>Position probability</b>	<b>Varies from 1 to 5</b>
<b>D</b>	<b>Event duration</b>	<b>Varies from 1 to 3</b>
<b>G</b>	<b>Event severity</b>	<b>Varies from 1 to 5</b>
<b>R</b>	<b>With or without ATS surveillance</b>	<b>With = 5 or Without = 10</b>
<b>W</b>	<b>Weather conditions</b>	<b>VMC=0 or IMC=5</b>
<b>T</b>	<b>Other traffic (if there would be)</b>	<b>With surveillance = 5 or</b>

		<b>Without surveillance = 10</b>
	<b>TOTAL</b>	<b>Maximum of 100 points</b>

Table 7: Description and value of parameters

### 3.4 Target Level of Safety (TLS)

3.4.1 Once the LHD analysis and evaluation process has been completed individually, the Risk Value resulting from each LHD is inserted into the Risk Matrix, designed to determine if the Risk Level of each event is equal to or below the established TLS for the CAR/SAM Regions, an acceptable level of which is 20 points.

<b>VR</b>	<b>Risk Level</b>	<b>Control</b>
<b>76 – 100</b>	<b>High</b>	Unacceptable risk, the RVSM space must be cancelled until the danger is mitigated and the risk is reduced to the medium or low level
<b>21 - 75</b>	<b>Medium</b>	Acceptable risk, but the follow-up and risk-management are mandatory
<b>01 - 20</b>	<b>Low</b>	Acceptable without restriction or limitation, hazards do not require an active risk-management, but must be documented

Table 8: Risk values and associated risk levels and control measures

3.4.2 After determining the Risk Level of each LHD, the States and International Organizations will have to develop and implement the necessary mitigation plans. These will be presented in the GTE meetings. The analysis performed by CARSAMMA and the GTE in the virtual meetings, as well as in the face to face meetings will be documented in a final report to the ICAO Regional Offices in Mexico and Lima, and in the GREPECAS meetings.

## Chapter 4

### Terms of Reference

#### 4.1 Introduction

4.1.1 The Terms of Reference (TOR) of the Regional RVSM CAR/SAM GTE were established with the purpose to review the problems affecting the TLS based on the LHD information provided by States and International Organizations

#### 4.1.2 Terms of Reference of the GTE

- A) Gather safety experts in safety management, air traffic control, aircraft flight operations, regulation and certification, data and risk models analysis;
- B) Analyse and review the large height deviations of 300 feet or more, as defined in ICAO Doc 9574, Manual on a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive;
- C) Coordinate with CARSAMMA the collection and review of data on LHDs;
- D) Determine and validate an estimate of the flight time out of the cleared flight level used to calculate the CRM by CARSAMMA;
- E) Identify the safety trends based on the reports of the LHDs and recommend mitigation actions associated with the LHDs in accordance with the ICAO SMS provisions. Send annual reports on the results of safety assessments to GREPECAS to improve safety in the CAR/SAM RVSM space; and;
- F) Perform other duties as indicated by GREPECAS.

#### 4.1.3 Composition:

CAR and SAM States, CARSAMMA, COCESNA, IATA, IFALPA, IFATCA, and Rapporteur:

#### 4.2 CARSAMMA Terms of Reference (ToR)

##### 4.2.1 CARSAMMA Functions:

- A) Maintain a central registry of RVSM approvals from operators and aircraft from each State/Territory using the CAR/SAM RVSM airspace;
- B) Facilitate the transfer of the approved data to and from other RVSM Regional Monitoring Agencies (RMAs);
- C) Establish and maintain a data base containing altimetry altitude system errors and deviations of 300 feet or more within the CAR/SAM RVSM airspace;
- D) Disseminate timely information to the CAAs the changes or monitoring status of the aircraft type classifications;
- E) Disseminate the results of the monitoring flights using the GPS-based Monitoring System (GMS);
- F) Provide the means to identify aircraft without RVSM approval operating in CAR/SAM RVSM airspace and report it to the State of Registry CAA;

- G) Develop the means to summarize and communicate the content of the data bases relevant to the RVSM GTE for the corresponding safety evaluation; and
- H) Review the Collision Risk Level assessment in the RVSM airspace in the CAR/SAM Regions, in accordance with ICAO Doc 9574 and Doc 9937.

## Chapter 5

### Reference Guide for Validation of LHD events

#### 5.1. Introduction

5.1.1 This reference guide is a consolidation of materials describing the construction, purpose and methodology of the CAR/SAM RVSM Scrutiny Group (GTE). It is intended to be used as a basic reference for anyone interested in Scrutiny Group activity.

5.1.2 It is essential that regional authorities consider all possible means of ascertaining and reducing the level of risk of collision resulting from operational errors that cause large height deviations (LHD). The CAR/SAM RVSM GTE is the primary group to evaluate and assess the operational aspects of large height deviations.

#### 5.2 System Performance Monitoring.

5.2.1 Experience has shown that large height deviations, a deviation in the vertical dimension from the cleared flight level whereby established margins of separation may be eroded, of 90 m (300 ft) or greater in magnitude have a significant impact on operational and technical risk in RVSM airspace. The causes of such deviations have been found to be, but are not limited to:

- a. An error in the altimetry or automatic altitude control system of an aircraft;
- b) Turbulence and other weather-related phenomena;
- c) An emergency descent by an aircraft without the crew following established contingency procedures;
- d) Response to airborne collision avoidance system (ACAS) resolution advisories;
- e) Not following an ATC clearance, resulting in flight at an incorrect flight level;
- f) An error in issuing an ATC clearance, resulting in flight at an incorrect flight level; and
- g) Errors in coordination of the transfer of control responsibility for an aircraft between adjacent ATC units, resulting in flight at an incorrect flight level.

5.2.2 The additional risk associated with operational errors and in-flight contingencies influence the outcome of RVSM safety assessments. Appendix H includes a diagram illustrating the LHD contribution to the overall risk assessment.

5.2.3 System performance monitoring, as outlined in ICAO doc 9574, is necessary to ensure the continued safe use of reduced vertical separation minimum (RVSM) and that established safety goals are met. This activity includes monitoring the minimum risk of collision associated with operational errors and in-flight contingencies. The monitoring process is divided into two main categories:

- A) Risk associated with the aircraft technical height-keeping performance (technical risk), and
- B) The overall risk, i.e. risk due to all causes.

5.2.4 The monitoring process involves the collection and evaluation of operational data. Appropriate methodologies will need to be in place to process this data in order to enable comparison with regionally agreed overall safety objectives.

### 5.3 Identifying Large Height Deviations

- 5.3.1 The GTE will evaluate all reports of interest and, based upon established GTE methodology, identify any altitude variation of 90m (300ft) or greater from the assigned or planned altitude. If a qualified deviation is identified, the event is categorized as a large height deviation.
- 5.3.2 When evaluating altitude variation events of 90m (300ft) or greater, it is not always clear that the event qualifies as a large height deviation. CARSAMMA, and the GTE, have developed policies for LHD validation, which are explained in this section.

### 5.4 Parameter Values

#### Cleared Flight Level

- 5.4.1 The flight level at which the pilot was cleared or currently operating. For example, aircrew accepts a clearance intended for another aircraft and ATC fails to capture the read back error or aircrew conforms to a flawed clearance delivered by ATC.
- 5.4.2 This parameter, in some cases, will require expert judgment and operational experience to assign a value. The Scrutiny Group must take into consideration the controller's plan versus the cleared flight level.

#### Event Flight Level

- 5.4.3 The event flight level is the flight level of error or the incorrect altitude of operation for an identifiable period of time without having received an ATC clearance.

#### Duration at Unplanned Flight Level

- 5.4.4 The greatest exposure to risk is the time spent level at a flight level other than the cleared level. This parameter value contributes significantly to the calculation of operational risk.
- 5.4.5 The duration at unplanned flight level is the length of time that an aircraft was level at an altitude (flight level) that was not cleared, or planned, by air traffic control. Duration is recorded in one second increments.
- 5.4.6 The calculation of duration begins once the aircraft is level at a flight level other than the cleared level or planned level by ATC, and terminates once ATC initiates remedial action.
- 5.4.7 Figure 1 illustrates a large height deviation that has a duration value larger than zero. The duration calculation begins and point A and terminates and point B.

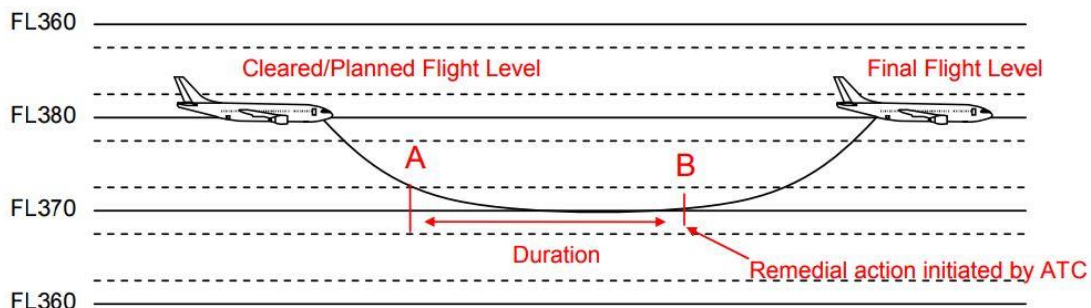


Figure 1.

- 5.4.8 It is important to note that not all large height deviations result in the aircraft being level at a flight level other than that cleared or planned by ATC; therefore, some events are assigned a duration value of zero.
- 5.4.9 It is also important to note the duration value determined or assigned by the GTE of LHDs that occur in a radar environment will vary significantly from that of a nonradar environment.
- 5.4.10 If the Scrutiny Group is unable to determine the time spent at incorrect flight level, a default value is assigned.
- 5.4.11 The GTE identified the need to establish a default duration value to assign to those events where there is not enough information included in the report to determine the time spent at incorrect flight level. Two default values were established, one for a radar Environment 60 seconds and one for a non-radar Environment 90minutes.

#### Total Vertical Deviation

- 5.4.12 Total vertical deviation is the distance in feet between the altitude of current operation prior to the deviation and the point at which the aircraft is once again under ATC supervision. A deviation that resulted in an increase of altitude will be recorded as a positive number and a deviation that resulted in a decrease of altitude will be recorded as a negative number
- 5.4.13 Figures 2 and 3 illustrate two large height deviations of different magnitudes. The first example, Figure 2, illustrates a large height deviation with a magnitude of 1000ft. The second example, Figure 3, illustrates a large height deviation with a magnitude of 1300 ft.

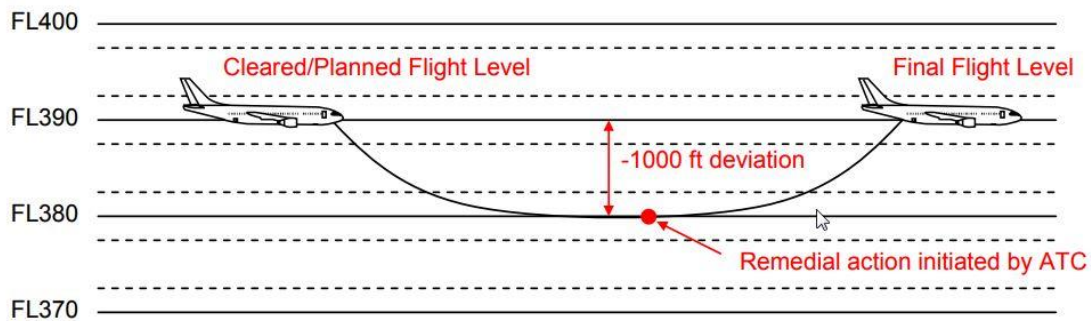


Figure 2.

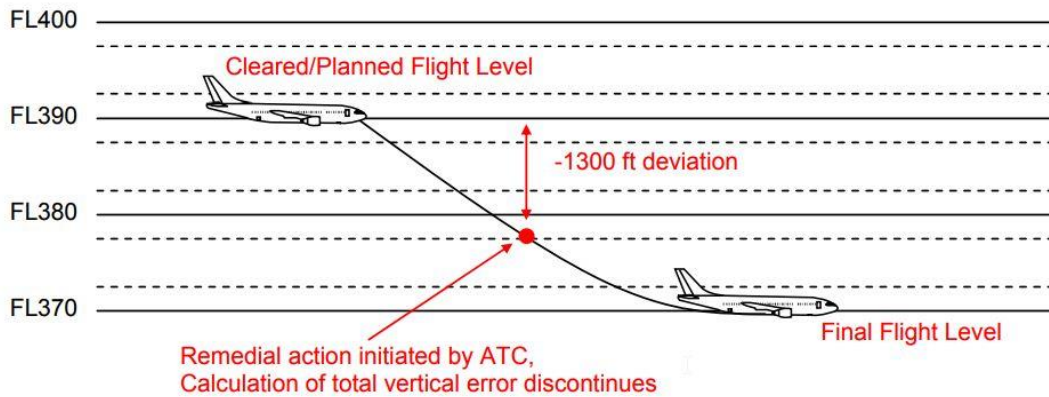


Figure 3.

#### Levels Crossed

5.4.14 The total number of flight levels between the point that the aircraft exits the cleared flight level and is once again under ATC supervision is calculated to determine the number of levels crossed. For example, in the examples provided in figures 2 and 3 in section 7.2.4.2, one level was crossed.

5.4.15 The Scrutiny Group must consider the hazard zone when calculating the number levels crossed. The hazard zone is also referred to as the buffer zone.

5.4.16 The hazard zone is the minimum physical distance of defined dimensions to accommodate:

- A) Variations in an aircraft's flight path due to air movements, etc.;
- B) The size of the aircraft;
- C) An additional "miss" distance

5.4.17 The value of the hazard zone was determined to be  $\pm 90$  m (300ft). A brief explanation of the considerations underlying this value is included in paragraph 2.3.6.7 in the Air Traffic Services Planning Manual (Doc 9426).

5.4.18 This buffer zone criterion shall be used to determine that a specific level is occupied by an aircraft. In the LHD illustrated in figure 4, the aircraft penetrates the buffer zone but does not reach the next flight level. Applying the criterion described in paragraph 7.2.5.4, the total number of levels crossed in this example is 1.

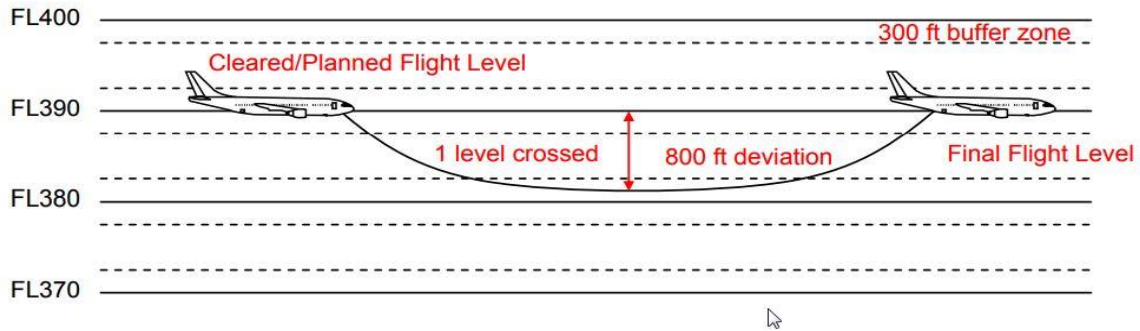


Figure 4

Final flight level

5.4.19 The final flight level is the cleared flight level after the error/deviation.

5.4.20 Some reports of large height deviations do not contain the final flight level. When this information is not available in the LHD report, the Scrutiny Group relies on operational expert judgment to determine the final flight level. The final flight level of the large height deviation illustrated in figure 5 is FL370.

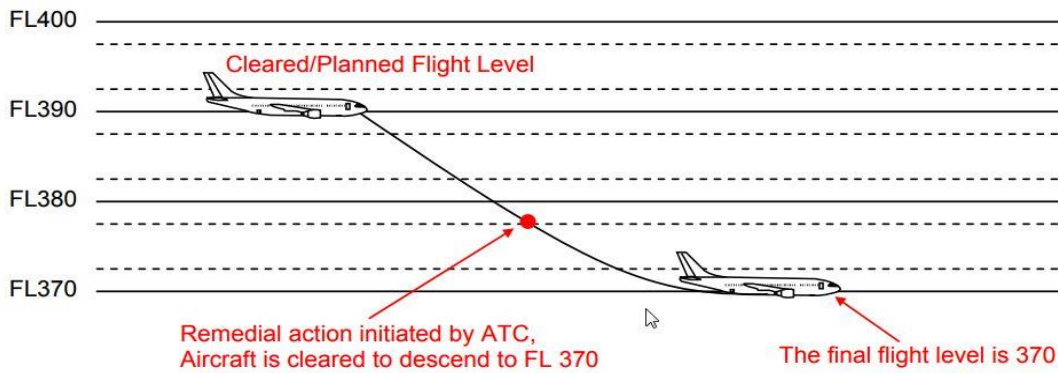


Figure 5.

Vertical speed of ascent or descent

5.4.21 The rate of climb or descent of an aircraft crossing through an uncleared level also contributes to the estimate of operational risk. In most cases, this parameter value is not included in reports of large height deviations. The GTE must rely on operational expert judgment to determine the rate of climb or descent.

5.4.22 The GTE established climb and descent rate default values.

Rate of Descent		Rate of Climb	
Drift	1000 ft per minute	Minimum	500
Normal	1500+ ft per minute	Normal	750
Rapid	2500+ ft per minute	Expedite	1250

Figure 6

Buffer zone between facilities

5.4.23 A period of time used to determine whether a facility-to-facility coordination error should be considered a large height deviation. The current value established by the GTE is 5 minutes or 40nm. In other words, if the boundary crossing estimate is provided before the agreed “buffer” duration/distance then the event is not considered to be an LHD; if the estimate is received equal to or less than the established buffer value then the event is an LHD.

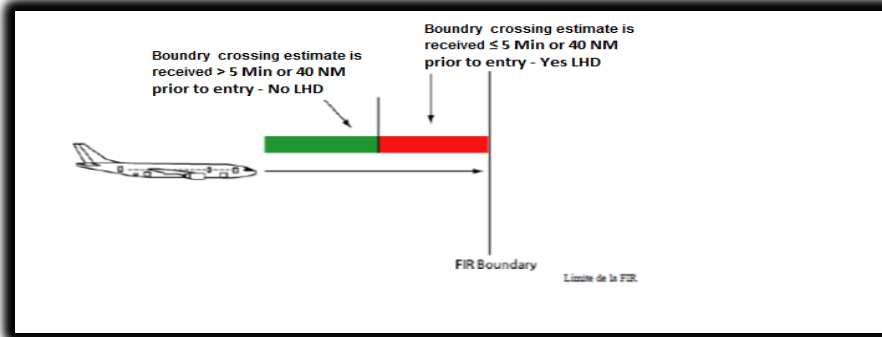


Figure 7

## 5.5 Event Category

5.5.1 Classification of each LHD event is necessary for risk assessment purposes and for the identification of adverse trends. Each LHD event is assigned an error type code that identifies the type of event that caused the deviation. The error codes are categorized as operational or technical for consideration in the Collision Risk Model (CRM). A complete list of the error codes is included in table 1.

<b>A</b> – Failure to climb/descend as cleared	<b>H</b> – Deviation due to in flight equipment failure causing an unintentional or undetected in flight level.
<b>B</b> – Climb/descend without ATC clearance.	<b>I</b> – Deviation due to turbulence or other weather-related cause.
<b>C</b> – incorrect operation or interpretation of on board systems (for example: incorrect FMS functioning, incorrect ATC clearance transcription or new ATC clearance, following flight plan instead of ATC clearance, follow initial ATC clearance instead of amended ATC clearance, etc)	<b>J</b> – Deviation due to collision avoidance system (TCAS) advisory; crew follows correctly TCAS RA.
<b>D</b> – ATC system loop error; (e.g. pilot misunderstands clearance message or ATC issues incorrect clearance)	<b>K</b> – Deviation due to collision avoidance system (TCAS) advisory; Crew follows incorrectly TCAS RA.
<b>E</b> – Coordination errors between ATC transfer units or control responsibility, as a consequence of human factors (for example: late or non-existent coordination; incorrect estimate or real time; flight level, ATS route, not adjusted to agreed parameters).	<b>L</b> – an aircraft not RVSM approved for which RVSM separation is provided (for example: flight plan indicating RVSM approval but aircraft not RVSM approved; wrong interpretation of flight plan from ATC)
<b>F</b> – Coordination errors between ATC transfer units as a result of equipment or technical failures.	<b>M</b> – Others. This includes flights that operate in airspace where normal air ground communication between crew and ATC unites can't be established.
<b>G</b> – Deviation due to contingency event that leads to the sudden incapacity to keep the assigned flight lever (for example: pressurization failure, engine failure)	

Table 1

## 5.6 Identify trends

5.6.1 The cumulative LHD summary is also used to identify adverse trends. The Scrutiny Group will evaluate grouped event categories and determine whether one particular event type occurs more often than another. This particular analysis can also be applied to geographic regions.

5.6.2 The Scrutiny Group will also identify operational trends that may be revealed in the data. If any exist, the Group may make recommendations for reducing the effect of those trends.

### Remedial Recommendations

5.6.3 If adverse trends are identified, the Scrutiny Group will submit recommendations for remedial actions to ensure that operational errors are kept to a minimum and that the airspace being examined continues to satisfy the requirements of the target level of safety, which is necessary to support continued RVSM operations.

5.6.4 It is important to bear in mind that height deviations, as a consequence of operational errors and in-flight contingencies, occur in all airspace irrespective of the separation minimum. The purpose of this monitoring activity is to ensure that operations in RVSM airspace do not induce an increase in the risk of collision from these events and that the total vertical risk does not exceed the agreed overall safety objectives. The actions and measures proposed to reduce risk should not be exclusive to RVSM airspace.

## 5.7 Events that qualify as LHDs and events that do not

### 5.7.1 Radar coverage in the adjacent area

When the receiving FIR has a radar coverage in the airspace of the transferring FIR and it is observed that the aircraft has a flight level different to the one previously coordinated, which was not revised, it is considered LHD, and the duration is considered zero (0). In the case that the transferring unit revises the estimate before crossing the TCP then it is not considered a LHD.

### 5.7.2 Without a radar coverage in the adjacent area

When the receiving FIR has contact with the aircraft before it enters its airspace, and it is made aware of the aircraft's change of flight level with respect to a level previously coordinated, we consider there is a LHD, and the duration is considered zero (0). In case the transferring unit revised the estimate before crossing the TCP then it is not considered a LHD.

### 5.7.3 Transfer time error

When an aircraft notifies over a position deviated in terms of time, 5 minutes or more ahead of the previously coordinated time due to a Coordination error or lack of revision of the time, this is considered a LHD. If the aircraft calls the receiver unit in the buffer zone established margins, then this is not considered a LHD. If the aircraft is delayed referenced to the previously coordinated time then this is not a LHD.

### 5.7.4 Lateral deviation

When an aircraft reports a laterally deviated position of the original point of transfer, either through another route or because of a deviation requested by the crew for operational convenience, we do not consider there is a LHD given that the initial philosophy of the reports of large height deviations exclusively corresponds to vertical deviations and not to lateral ones; however, for safety purposes in the RVSM airspace, these event should be reported to CARSAMMA.

### 5.7.5 Lateral deviation with radar coverage in the adjacent area

When an aircraft flies into an airspace that was not included in its route due to an operational deviation, this is not considered an LHD. Since this is an operation error made by the ACC that is aware of the deviation and that failed to report it to the affected ACC, this event should be considered a coordination incident between adjacent FIRs.

5.7.6 Without radar coverage

When an aircraft flies into a receiving FIR and reports a flight level different from the one previously coordinated, this is considered an LHD. We must take into account the time when the aircraft passes the FIR border and the corresponding ACC becomes aware of the traffic and takes an action regarding the deviation whether this action means leaving the aircraft at the level it is reporting or move the aircraft to a level at which it does not conflict with the FIR's traffic plan.

---

## Chapter 6

### Training Programme for POC to the CAR/SAM Monitoring Agency CARSAMMA

#### 6.1 General Purpose:

6.1.1 At the end of this training, the States Points of Contact to the CAR / SAM Regions Monitoring Agency (CARSAMMA) will be able to perform the tasks according to their functions in an optimal manner, sending to CARSAMMA the data corresponding to the movement of aircraft in RVSM airspace, as well as the LHD forms, with the expected quality and within the established deadlines.

Specific objectives:

- A) Train the POC for the proper completion of the Aircraft Movement Form (F0).
- B) Train the POC for the proper completion of the LHD report Form (F4).
- C) Train the Focal Points to carry out the proper LHD analysis using the methodology based on the Safety Management Systems..
- D) Train Focal Points in the use of the LHD Reference Guide for the identification of a LHD event.
- E) Train the Focal Points to interpret the result of safety measurements using the Collision Risk Model (CRM).

#### 6.2 Lessons Plan

##### Module 0 Introduction

Provide guidance to staff about the background in the implementation of Reduced Vertical Separation, the need for constant monitoring, the creation of CARSAMMA, as well as current regulations.

Explain personnel the functions of CARSAMMA and the GTE, the work methodology including Teleconferences.

##### Module 1 Filling of the aircraft movement form (F0)

Provide guidance to staff about the information required to complete the F0 form of CARSAMMA, complying with the required data format as well as the deadlines for the delivery of this information.

##### Module 2 Filling of the LHD Report Form (F4)

Provide guidance to staff about the information required to complete the F4 form of the CARSAMMA, complying with the required data format as well as the deadlines for the delivery of this information.

##### Module 3 LHD Analysis using the SMS based Methodology

Provide guidance to staff about the LHD analysis using the methodology based on the Safety Management System, using the Manual Guide on LHD Evaluation based on a Safety Management System (SMS) for the CAR / SAM Regions.

##### Module 4 Use of the LHD Reference Guide

Provide guidance to staff to validate the LHD events using the LHD reference guide.

**Module 5 Interpretation of the CRM evaluation**

Induce staff in the correct interpretation of the results of the CRM assessment carried out by CARSAMMA in order to provide feedback to their organization with respect to the level of Operational Safety of their Flight Information Region (FIR) or their State..

**Module 6 Use of the Excel Template for the calculation of the Average Risk level**

Provide guidance to the POCs in the use of the Excel Template for the Calculation of the Average Risk Level of their Flight Information Region.

## Appendix A

### CARSAMMA F0 Form – Aircraft Movements

#### 1 Introduction

1.1 This guidance is to standardize the fulfillment of data collection template, aiming to obtain an air traffic movement sample for safety assessment of operations in CAR/SAM airspace.

MANDATORY FIELDS													OPTIONAL FIELDS							
FIR IDENTIFICATION:													PROGRESSING IN RVSM AIRSPACE							
DATE	AIRCRAFT		AIRCRAFT	ORIGIN	DESTINATION	ENTRY	TIME	FL	AIRWAY	EXIT	TIME	FL	FIX 1	TIME	FL	FIX 2	TIME	FL	CONTINUE	
	CALL	AIRCRAFT	TYPE	AERODROME	AERODROME	RVSM	ENTRY	ENTRY	ENTRY	RVSM	EXIT	EXIT		AT	AT		AT	AT	IF NECESSARY	
	SIGN	REGISTRATION				AIRSPACE	FIX	FIX	FIX	AIRSPACE	FIX	FIX		FIX 1	FIX 1		FIX 2	FIX 2		
01/09/03	...	PTLPN	C550	SBGH	SBBR	VURKI	12:20	310	UW12	IMEDI	12:29	310								annex: example 1
01/09/03	GLO1713	PRGFT	B737	SBRF	SBGL	NUJQ	19:30	390	UW60	PCNGA	20:12	390								annex: example 2
01/09/03	ARG1303	LVSDE	B747	KMIA	SAEZ	ELAKA	09:45	370	UT410UA30	ISOPO	10:47	370	CERES	10:40	370					annex: example 4
02/09/03	TAM8097	PRMDF	A332	LFPG	SBGR	KAKUD	07:29	390	UG741	MENDS	08:33	390	MCL	07:35	390					
...	...	...	...	...	...	...	...	...	...	...	...	...								
...	...	...	...	...	...	...	...	...	...	...	...	...								
18/09/03	IBE6824	EC1944	A340	SBGR	LEMD	BGC	20:06	290	UW13	RIGEL	21:10	370	COTON	20:40	330	CNF	20:54	370		annex: example 4
...	...	...	...	...	...	...	...	...	...	...	...	...								
...	...	...	...	...	...	...	...	...	...	...	...	...								
30/09/03	PTSAC	PTSAC	E135	SBCG	SBEG	TOSAR	10:57	350	UW28	RAPAT	11:41	390								annex: example 3

1.2 An "EXCEL" electronic form should be used and all events (air traffic movements) of every day of whole requested period, should be shown in chronological sequence in only one form without any interposed blank line or heading.

1.3 The fulfillment of all fields is mandatory, except the fields contained in the entitled interval "Optional Fields" that should only be filled out if there is any change of flight level and/or airway.

1.4 Data Sample should describe daily air traffic movement between FL290 and FL410 included, in requested period, by FIR and in all air routes of the FIR.

#### 2 - Mandatory Fields

- Line 16: FIR Identification

It shall be filled out according to ICAO designators contained in Doc. 7910.  
Examples: SBBS, SLLF, SAEU.

- Column A: Date

It shall be filled just with numeric characters in the following way: dd/mm/yy  
Examples: February 01, 2003 enter 01/02/03.

- Column B: Aircraft Call Sign

It shall be filled with seven alphanumeric characters at most, with no blank space or hyphen.  
Examples: AAL906, PTLCN, VRG8764.

- Column C: Aircraft Registration

It shall be filled (if knowed) with alphanumeric characters.  
Examples: N758T, YV1920, CUT3457

- Column D: Aircraft Type

It shall be filled out according to ICAO designators contained in Doc. 8643.  
Examples: for Airbus A320-211 enter A320;

- Column E: Origin Aerodrome

It shall be filled out according to ICAO designators contained in Doc. 7910.  
Examples: SBGR, SCEL, SAEZ.

- Column F: Destination Aerodrome

It shall be filled out according to ICAO designators contained in Doc. 7910.

Examples: SKBO, MPTO, SEQU.

- Column G: Entry Fix into RVSM Airspace

It shall be filled with five alphabetical characters at most, according to the name of the fix of entrance in corresponding airspace.

Examples: UGADI, ILURI, BAQ

RMK: For flights climbing into the RVSM airspace, without crossing FIR boundary, the entry fix will be the fix before the first fix that the aircraft pass leveled.

- Column H: Time at Entry Fix

It shall be filled with numeric characters in the following way: hh:mm

Examples: for 01 hour and 09 minutes enter 01:09;

- Column I: Flight Level at Entry Fix

It shall be filled with three numeric characters corresponding to the flight level at entry fix of RVSM airspace.

Examples: for FL290 enter 290; for FL310 enter 310.

- Column J: Airway at Entry Fix

It shall be filled with five alphanumeric characters at most, without space or hyphen.

Examples: UA301; UB689; UW20; UW7.

RMK: When aircraft change airway during the flight in RVSM airspace, the new airway must be reported after the first one separated by the character "/".

Example: UL302/UW650.

- Column K: Exit Fix from RVSM Airspace

It shall be filled with five alphabetic characters at most, according to the name of the fix of exit from corresponding airspace.

RMK: This fix will normally be the FIR limit, or the last one crossed by aircraft while in leveled flight.

Examples: INTOL, NIKON, CARPA

- Column L: Time at Exit Fix

It shall be filled with numeric characters in the following way: hh:mm

Examples: for 08 hours and 07 minutes enter 08:07;

- Column M: Flight Level at Exit Fix

It shall be filled with three numeric characters, corresponding to the flight level at exit fix of RVSM airspace.

Examples: for FL330 enter 330; for FL350 enter 350.

### 3 – Optional Fields (“Progressing of the flight in Airspace”)

- Column N: Fix 1

It shall be filled with five alphabetical characters at most, according to the name of fix where flight level and/or airways changes have been made.

Note: This fix will be the last one the aircraft has crossed in leveled flight.

Examples: BAQ, KUBEK

- Column O: Time at Fix 1

It shall be filled with numeric characters in the following way: hh:mm.

Examples: for 10 hours and 05 minutes enter 10:05;

- Column P: Flight Level at Fix 1

It shall be filled with three numeric characters corresponding to the flight level in the fix 1.

Examples: for FL370 enter 370;

Note: Fill out "Fix/Time/Flight-Level" fields as many as they are required to describe every change occurred.

---

## Appendix B

### CARSAMMA F1 – Point of Contact



### CARSAMMA FORM F1 POINT OF CONTACT DETAILS/CHANGE OF POINT OF CONTACT

*This form should be completed and returned to the address below on the first reply to the CARSAMMA or when there is a change to any of the details requested on the form (PLEASE USE BLOCK CAPITALS).*

STATE OF REGISTRY:

STATE OF REGISTRY (ICAO 2 LETTER IDENTIFIER):   
Enter the 2-letter ICAO identifier as contained in ICAO Doc 7910. In the event that there is more than one identifier for the same State, the one that appears first in the list should be used.

ADDRESS:  
Digite aqui o endereço completo do contato

#### CONTACT

Full Name:

Title:  Surname:  Initials:

Post/Position:

# Telephone:  # Fax:

E-mail:

\*Initial Reply  \*Change of Details  (\*Mark as appropriate)

*When complete, please return to the following address:*  
Caribbean and South American Monitoring Agency - CARSAMMA  
AV. GENERAL JUSTO, 160/Térreo - CENTRO  
22295-090 - RIO DE JANEIRO - RJ  
Telephone: (55-21) 2101-6358 Fax: (55-21) 2101-6293  
E-Mail: [carsamma@decea.gov.br](mailto:carsamma@decea.gov.br)

#### NOTE TO AID COMPLETION OF CARSAMMA FORM F1

1. It is important for the RMAs to have an accurate record of a point of contact for any queries that might arise from on-going height monitoring. Recipients are therefore requested to include a completed form CARSAMMA F1 with their first reply to CARSAMMA. Thereafter, there is no further requirement unless there has been a change to the information requested on the form.

## Appendix C

### CARSAMMA F2 – RVSM Approval



**CARSAMMA F2 FORM  
RECORD OF APPROVAL TO OPERATE IN  
CAR/SAM AIRSPACE**

1. When a State of Registry approves or amends the approval of an operator/aircraft for operations within the CAR/SAM airspace, details of that approval must be recorded and sent to CARSAMMA to reach it by the tenth day of the month following the month that the approval was issued.
2. Before providing the information as requested below, reference should be made to the accompanying notes (**PLEASE USE BLOCK CAPITALS**).

State of Registry <sup>1</sup> :	<input type="text"/>
Name of Operator <sup>2</sup> :	<input type="text"/>
State of Operator <sup>3</sup> :	<input type="text"/>
Aircraft Type <sup>4</sup> :	<input type="text"/>
Aircraft Series <sup>5</sup> :	<input type="text"/>
Manufacturer's Serial Number <sup>6</sup> :	<input type="text"/>
Registration Number <sup>7</sup> :	<input type="text"/>
Mode S Address Code <sup>8</sup> (if applicable):	<input type="text"/>
Airworthiness Approval <sup>9</sup> :	<input type="text"/>
Date Issued <sup>10</sup> :	<input type="text"/>
RVSM Approval <sup>11</sup> :	<input type="text"/>
Date Issued <sup>12</sup> :	<input type="text"/>
Date of Expiry <sup>13</sup> (if applicable):	<input type="text"/>
Remarks <sup>14</sup> :	<input type="text"/> <small>Fill in if necessary.</small>

*When complete, please return to the following address by the next business day:*  
**CARIBBEAN AND SOUTH AMERICA MONITORING AGENCY - CARSAMMA**  
 AV. GENERAL JUSTO, 160/Térrea - CENTRO  
 22295-090 - RIO DE JANEIRO - RJ  
 Telephone: (55-21) 2101-6358 Fax: (55-21) 2101-6293  
 E-Mail: [carsamma@decea.gov.br](mailto:carsamma@decea.gov.br)

**Responsible inspector for the above information:**  Name and signature.

#### NOTES TO AID COMPLETION OF CARSAMMA FORM F2

1. Enter the two letter ICAO identifier as contained in ICAO Doc 7910.
2. Enter the operator's 3 letter ICAO identifier as contained in ICAO Doc 8585. For International General Aviation, enter "IGA" (write the name of the operator/ owner in the Remarks 14 field). For military aircraft, enter "MIL".
3. Enter the two letter ICAO identifier as contained in ICAO Doc 7910.

4. Enter the ICAO designator as contained in ICAO Doc 8643, e.g., for Airbus A320-211, enter A322; for Boeing B747-438 enter B744.
5. Enter series of aircraft type or manufacturer's customer designation, e.g., for Airbus A320-211, enter 211; for Boeing B747-438, enter 400 or 438.
6. Enter aircraft serial number as given by manufacturer.
7. Enter aircraft's current registration number.
8. Enter ICAO allocated Aircraft Mode S address code (*if applicable*).
9. Enter yes or no indication of airworthiness approval.
10. Enter date of airworthiness approval. Example: For October 26, 2008 write 10/26/08.
11. Enter yes or no indication of RVSM approval.
12. Enter date of RVSM approval. Example: For November 26, 2008 write 11/26/08.
13. Enter date of expiry for RVSM approval. Example: For November 26, 2010 write 11/26/10.
14. Fill in if necessary. Use a separate sheet of paper if insufficient space available.

## Appendix D

### CARSAMMA F3 – RVSM Withdrawal



#### CARSAMMA FORM F3 WITHDRAWAL OF APPROVAL TO OPERATE IN CAR/SAM RVSM AIRSPACE

1. When a State of Registry has cause to withdraw the approval of an operator/aircraft for operations within the CAR/SAM airspace, details as requested below, must be submitted to CARSAMMA by the most appropriate method.
2. Before providing the information as requested below, reference below, reference should be made to the accompanying notes (PLEASE USE BLOCK CAPITALS).

State of Registry <sup>1</sup> :	<input type="text"/>
Name of Operator <sup>2</sup> :	<input type="text"/>
State of Operator <sup>3</sup> :	<input type="text"/>
Aircraft Type <sup>4</sup> :	<input type="text"/>
Aircraft Series <sup>5</sup> :	<input type="text"/>
Manufacturers Serial No <sup>6</sup> :	<input type="text"/>
Registration <sup>7</sup> :	<input type="text"/>
Aircraft Mode S Address Code <sup>8</sup> :	<input type="text"/>
Date of Withdrawal of RVSM Approval <sup>9</sup> :	<input type="text"/>
Reason of Withdrawal of RVSM Approval <sup>10</sup> :	<input type="text"/>
Remarks <sup>11</sup> :	Fill in if necessary.

When complete, please return to the following address by the next business day:

CARIBBEAN AND SOUTH AMERICAN MONITORING AGENCY - CARSAMMA  
AV. GENERAL JUSTO, 160/Térreo - CENTRO  
22295-090 - RIO DE JANEIRO - RJ  
Telefone: (55-21) 2101-6358 Fax: (55-21) 2101-6293  
E-Mail: [carsamma@decea.gov.br](mailto:carsamma@decea.gov.br)

Responsible inspector for the above  
information:: Name and Signature.

#### NOTES TO AID COMPLETION OF CARSAMMA FORM F3

1. Enter the two letter ICAO identifier as contained in ICAO Doc 7910.
2. Enter the operator's 3 letter ICAO identifier as contained in ICAO Doc 8585. For International General Aviation, enter "IGA" (write the name of the operator/ owner in the Remarks 11 field). For military aircraft, enter "MIL".
3. Enter the two letter ICAO identifier as contained in ICAO Doc 7910.
4. Enter the ICAO designator as contained in ICAO Doc 8643, e.g., for Airbus A320-211, enter A322; for Boeing B747-438 enter B744.

5. Enter series of aircraft type or manufacturer's customer designation, e.g., for Airbus A320-211, enter 211; for Boeing B747-438, enter 400 or 438.
6. Enter aircraft serial number as given by manufacturer.
7. Enter aircraft's current registration number.
8. Enter ICAO allocated Aircraft Mode S address code.
9. Enter date of withdrawal of RVSM approval. Example: For October 26, 2008 write 10/26/08.
10. Enter the reason of withdrawal of RVSM approval.
11. Fill in if necessary. Use a separate sheet of paper if insufficient space available.

*CARSAMMA form F3 must be completed and forwarded to CARSAMMA immediately when the state of registry has cause to withdraw the approval of an operator/aircraft for operations with CARSAMMA RVSM Airspace.*

## Appendix E

### CARSAMMA F4 – Large Height Deviation

#### REPORT OF LARGE HEIGHT DEVIATION OF 300 FT OT MORE BETWEEN FL 290 AND FL 410

Report to the Caribbean and South American Monitoring Agency (CARSAMMA) of a height deviation of 300ft or more, including:

- 1) Those due to TCAS/ACAS;
- 2) Turbulence and contingency events; and
- 3) Operational errors resulting in flight at an incorrect level or coordinated by ATC units.

**NOTE:** The ATC Units are requested to inform CARSAMMA the LHD reports by the 10th day of the following month even if **NO** deviation occurs.

Name of FIR \_\_\_\_\_ .

Please complete Section I or II as appropriate.

#### SECTION I:

There were NO reports of large altitude deviation for the month/year \_\_\_\_\_ .

#### SECTION II:

There was (were) \_\_\_\_ report(s) of a height deviation of 300ft or more between FL 290 and FL410. Details of the height deviation are attached (Large Deviation Report Form).

(Please use a separate form for each report of height deviation).

#### SECTION III:

*When complete, please return to the following address by the next business day:*

CARIBBEAN AND SOUTH AMERICA MONITORING AGENCY - CARSAMMA

AV. GENERAL JUSTO, 160/Térreo - CENTRO

22295-090 - RIO DE JANEIRO - RJ

Telefone: (55-21) 2101-6358 Fax: (55-21) 2101-6293

E-Mail: [carsamma@decea.gov.br](mailto:carsamma@decea.gov.br)

NOTES TO AID COMPLETION OF CARSAMMA F4 FORM

**Specification of the fields:**

1. Enter today's date.
2. Enter the 4 (four) letter ICAO identifier for the fir or enter the name of the reporting unit.
3. Enter the operator's 3 (three) letter ICAO identifier. for international general aviation, enter "iga".
4. Enter the call sign and the acft registration number.
5. enter the ICAO designator as contained in ICAO Doc 8643, e.g., for Airbus A320-211, enter A320; for Boeing B747-438, enter B744.
6. Enter "yes" or "no". if "yes", inform the flight level.
7. Enter the date of occurrence.
8. Enter the time UTC of occurrence.
9. Enter the occurrence position (fix, lat/long or radial and nautical miles).
10. Select one option if: **IMC** - instrument condition, **VMC** – visual condition.
11. Enter the cleared route of flight (in case of direct or aleatoric flights, enter "DCT").
12. Enter the cleared flight level.
13. Enter the estimated duration at incorrect flight level (in seconds).
14. Enter the observed deviation in feet (for upwards deviations, write "+", for downwards deviations, write "-").
15. Enter the other traffic involved, if any (call sign, registration number, flight level, aircraft type, route and distance).
16. Enter the cause of deviation according to the table below:

<b>A</b> – Flight crew failing to climb / descend the aircraft as cleared.	<b>H</b> – Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level.
<b>B</b> – Flight crew climbing / descending without ATC cleared.	<b>I</b> – Deviation due to turbulence or other weather-related cause.
<b>C</b> – Incorrect operation or interpretation of airborne equipment (e.g.: incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance, etc...).	<b>J</b> - Deviation due to TCAS RA; flight crew correctly following the RA.
<b>D</b> - ATC system loop error (e.g.: ATC issues incorrect clearance or flight crew misunderstands clearance message).	<b>K</b> - Deviation due to TCAS RA; flight crew incorrectly following the RA.
<b>E</b> – Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of Human Factors (e.g.: late or non-existent coordination; incorrect time estimate / actual; flight level, ATS route, etc... Not in accordance with agreed parameters)	<b>L</b> – An aircraft that is not RVSM approved being provided with RVSM separation (e.g.: flight plan indicating RVSM approval, but aircraft not approved; ATC misinterpretation of flight plan).
<b>F</b> – Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of Equipment outage or technical issues.	<b>M</b> – Other – this includes flights operating (including climbing / descending) in airspace where flight crews are unable to establish normal air-ground communications with the responsible ATS unit.
<b>G</b> - Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight (e.g.: pressurization failure, engine failure, etc...).	

17. Enter the observed/reported final flight level, providing the source of information (mode c and/or pilot).
18. Select this option if the aircraft was above the cleared level.
19. Select this option if the aircraft was below the cleared level.
20. Select one of the options: if the fl complied with the ICAO annex 2 tables of cruising levels.
21. Write a brief description of deviation.
22. Write the crew comments, if any.



The information contained in this form is confidential and will be used for statistical safety analysis purposes only.

### CARSAMMA F4 FORM LARGE HEIGHT DEVIATION

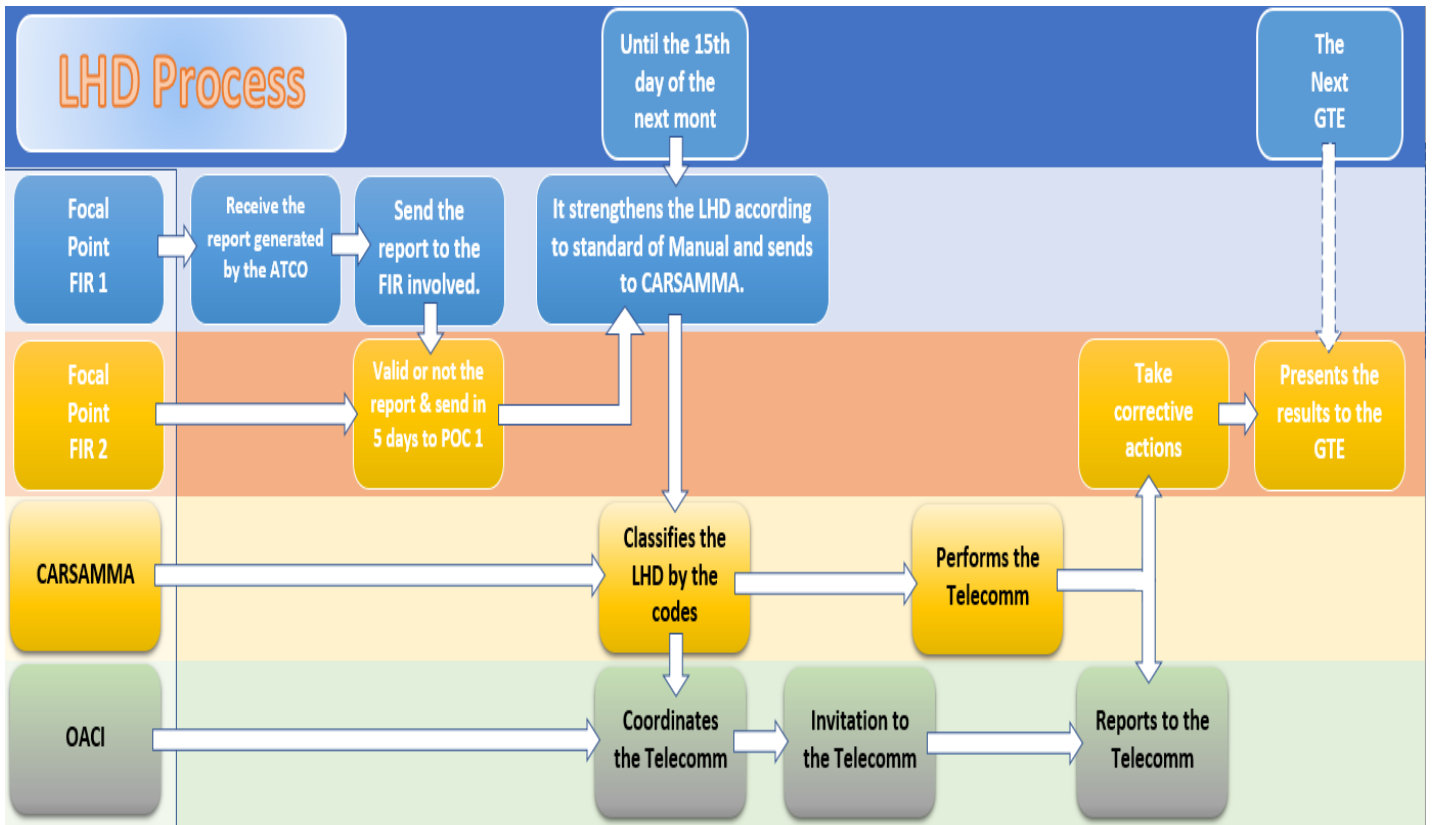
Report to the CARSAMMA of an altitude deviation of 300ft or more, including those due to TCAS, Turbulence and Contingency Events

1. <del>Today's</del> date:		2. <del>Reporting</del> Unit:	
DEVIATION DETAILS			
3. Operator Name:		4. Call Sign:	
		ACFT Registration Number:	
5. <del>Aircraft Type:</del>		6. Mode C/ADS Displayed: <input type="checkbox"/> Yes. Which FL? _____ <input type="checkbox"/> No.	
7. <del>Date of Occurrence:</del>		8. Time UTC:	
9. Occurrence Position (lat/long or Fix):		10. Weather Conditions: <input type="checkbox"/> VMC <input type="checkbox"/> IMC	
11. Cleared Route of Flight:			
12. Cleared Flight Level:		13. Estimated Duration at Incorrect Flight Level (seconds):	
14. <del>Observed Deviation (+/- ft):</del>			
15. Other Traffic Involved and Distance:			
16. Cause of Deviation (brief title):  (Examples: ATC Loop Error, Turbulence, Weather, Equipment Failure)			
AFTER DEVIATION IS RESTORED			
17. Observed/Reported Final Flight Level*: *Please indicate the source of information: <input type="checkbox"/> Mode C <input type="checkbox"/> ADS <input type="checkbox"/> Pilot <input type="checkbox"/> Other: _____		Mark the appropriate Box	
		18. Is the FL above the cleared level: <input type="checkbox"/>	
		19. Is the FL below the cleared level: <input type="checkbox"/>	
		20. Did this FL comply with the ICAO Annex 2 Tables of Cruising Levels? <input type="checkbox"/> Yes <input type="checkbox"/> No	
NARRATIVE			
21. Detailed Description of Deviation (Please give your assessment of the actual track flown by the aircraft and the cause of the deviation.)			
22 - CREW COMMENTS (IF ANY)			

When complete, please return to the following address by the next business day:  
CARIBBEAN AND SOUTH AMERICA MONITORING AGENCY - CARSAMMA  
AV. GENERAL JUSTO, 160/~~Térreo~~ CENTRO  
22295-~~080~~ RIO DE JANEIRO - RJ  
Telephone: (55-21) 2101-6358 Fax: (55-21) 2101-6293  
E-Mail: [carsamma@decea.gov.br](mailto:carsamma@decea.gov.br)

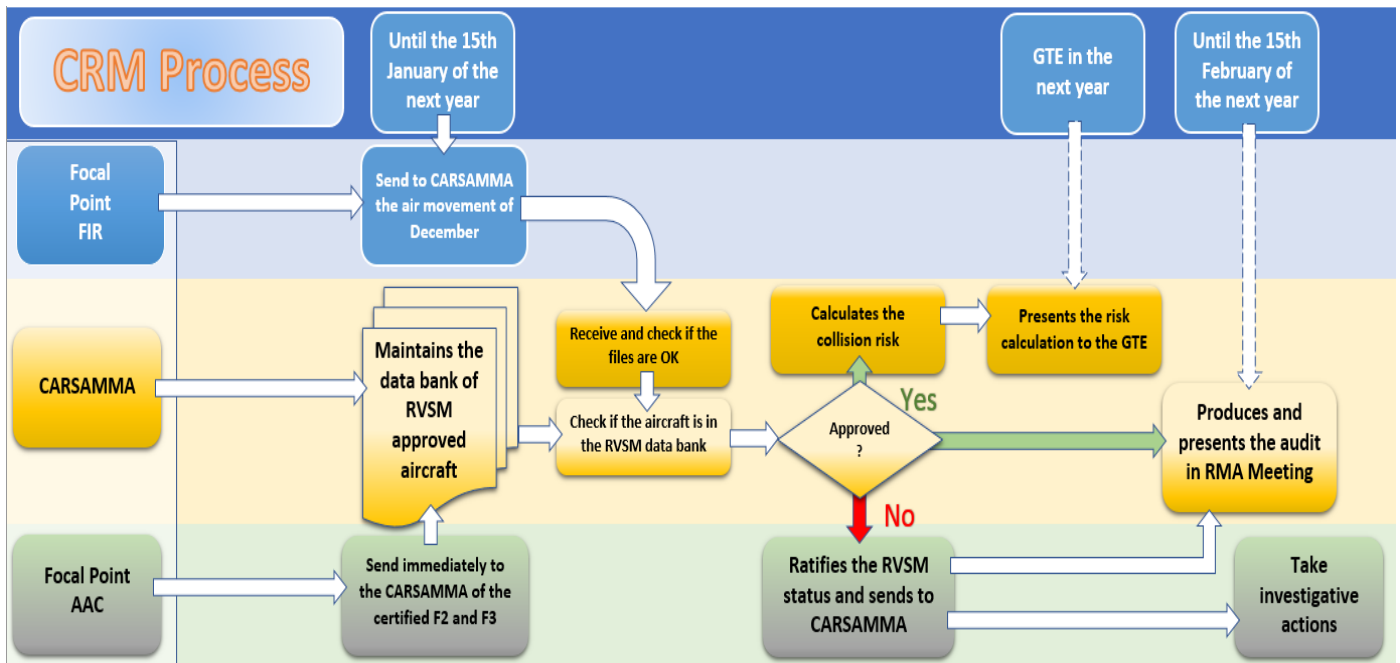
Appendix F

Flowchart of the process of reporting and validation of the LHD



Appendix G

Flowchart of the CRM Analysis Process of the LHD



## Appendix H

### Precision of SSR Data Mode C

When using SSR mode C data, the following errors that affect accuracy must be taken into account:

- A. Correspondence Error, which reflects discrepancies between the level information used and the encrypted level information for automatic transmission. The maximum value of this error  $f \pm 38$  m (125 ft) (95 percent probability) has been accepted (see annex 10, Volume I, Part I, 3.8.7.12.2.5, ICAO);
- B. Technical Flight Error, which reflects inevitable deviations from the aircraft with respect to the planned level, in response to flight control operations, turbulence, etc. This error, when related to manual flight aircraft, tends to be greater than that of an aircraft controlled by autopilot. The maximum value of this error that has been used to date, based on a probability of 95 percent, is  $\pm 60$  m (200 ft) (see the report of the Departmental Meeting COM/OPS (1966), question 9, page 9-35, 4.2). However, it should be noted that since then there have been improvements in several factors contributing to this value.

The mathematical combination of the unrelated errors indicated in the headings a) and b) above results in a value of  $\pm 72$  m (235 ft) (based on a probability of 95 percent), so it is believed that a value of  $f \pm 90$  m (300 ft) represents a valid criterion of decision to be applied in practice at the time of:

- a) Verify the accuracy of SSR mode C data;
- b) Determine the rate of occupancy of the levels.

## Appendix I

### Functional duties of the contact points of the Fir's CAR/SAM

#### Introduction

In addition to the provisions of Chapter 2, 2.4 Responsibilities of the Points of Contact (POC), these are responsible for:

- a) Collect reports on LHD events.
- b) Collect and protect data on LHD events.
- c) Conduct the investigation of the LHD events.
- d) Exchange information about the LHD events with the FIR's involved, as well as with the operator (s) involved, where appropriate.
- e) Develop form F4.
- f) Send form F4 to CARSAMMA through the channels and within the established deadline.
- g) Participate in teleconferencing and validate the LHD events.
- h) Collect data on aircraft movements in airspace RVSM.
- i) To debug the data on aircraft movements and to elaborate the form F0.
- j) Send the form F0 to CARSAMMA through the channels and within the established deadline.
- k) Participate in the annual meetings of the Working Group and Scrutiny.
- l) Participate in the training or meeting actions on the LHD issue that ICAO convenes.

## Appendix J

### REFERENCE DOCUMENTS

#### List of reference documents

CANADÁ. International Civil Aviation Organization. *Manual on Implementation of a 300m (1000ft) Vertical Separation Minimum Between FL290 and FL410 Inclusive*: **Doc 9574**. Montreal, 2012.

CANADÁ. International Civil Aviation Organization. *Manual of Operating Procedures and Practices for Regional Monitoring Agencies in Relation to the Use of a 300 m (1000ft) Vertical Separation Minimum above FL 290*: **Doc 9937-AN477**. Montreal, 2012.

CANADÁ. International Civil Aviation Organization. *Location Indicators*: **Doc. 7910**. Montreal, 2012.

CANADÁ. International Civil Aviation Organization. *Aircraft Type Designators*: **Doc 8643**. Montreal, 2012.

CANADÁ. International Civil Aviation Organization. *Performance-Based Manual*: **Doc 9613-AN 937**. Montreal, 2012.

CUBA. Working Paper *Mejores Prácticas para Validación*: **GTE 14**. México, 2014.

---