SAM/IG/6

INTERNATIONAL CIVIL AVIATION ORGANIZATION

South American Office

Sixth Workshop/Meeting of the SAM Implementation Group
Regional Project RLA/06/901

(SAM/IG/6)

FINAL REPORT

Lima, Peru, 18 to 22 October 2010

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HISTORY OF THE MEETING

ii-1 PLACE AND DURATION OF THE MEETING

The Sixth Workshop/Meeting of the SAM Implementation Group (SAM/IG/6) was held at the premises of the ICAO South American Regional Office in Lima, Peru, from 18 to 22 October 2010, under the auspices of Regional Project RLA/06/901.

ii-2 OPENING CEREMONY AND OTHER MATTERS

Mr. Franklin Hoyer, Regional Director of the ICAO South American Office, greeted the participants for the continuous support provided to activities developed at regional scale by the South American Office, as well as to the civil aviation authorities and national and private organizations of the ICAO South American Region for the continuous support to the activities of the SAM Implementation Group. He highlighted the importance of Regional Project RLA/06/901, which hosts the realisation of these events, as well as the synergy reached with Regional Project RLA/99/901, which has oriented its activities towards meeting the implementation requirements of the South American Region. Finally, he pointed out the importance of issues to be dealt with in the agenda of the Sixth Workshop/Meeting, and emphasized that the teamwork shown by the Implementation Group is essential to execute the projects that have been adopted by the Region.

ii-3 SCHEDULE, ORGANIZATION, WORKING METHODS, OFFICERS AND SECRETARIAT

The Meeting agreed to hold its sessions from 09:00 to 15:00 hours, with appropriate breaks. The work was done with the Meeting as a Single Committee, Working Groups and Ad-hoc Groups.

Mr. Ari Rodrigues Bertolino delegate from Brazil, acted as Chairman of the Meeting and Mr. Paulo César Vila Millones, delegate from Peru, as Vice President.

Mr. Jorge Fernández, RO/ATM/SAR of ICAO Regional Office, Lima, acted as Secretary, assisted by Messrs. Onofrio Smarrelli, RO/CNS, Alberto Orero, RO/ATM/SAR/AIM, from the Lima Office, and the Project RLA/99/901 experts. Likewise, the Secretariat had the support of Messrs. Julio de Souza Pereira Andrés Prado, Ari Rodrigues Bertolino, Guillermo Cocchi, Obdulio Gouarnalusse, Alessander de Andrade de Santoro and Jorge Wilson de Avila, PBN, OPS/AIR, ATFM, ATSRO, CNS, AUTO and FPL, respectively, to analyse de different agenda items.

ii-4 WORKING LANGUAGES

The working language of the Meeting was Spanish, with simultaneous interpretation in English, and its relevant documentation was presented in Spanish and English.

ii-5 **AGENDA**

The following agenda was adopted:

Agenda Item 1: Follow up to Conclusions and Decisions adopted by SAM/IG Meetings

Agenda Item 2: Optimization of the ATS routes

Agenda Item 3: Implementation of performance-based navigation (PBN) in the SAM Region

Agenda Item 4: Standards and procedures for performance-based navigation operations approval

Agenda Item 5: Air Traffic Flow Management Implementation (ATFM) in the SAM Region

Agenda Item 6: Assessment of operational requirements in order to determine the implementation of communications and surveillance (CNS) capabilities improvement for en-route and terminal area operations

Agenda Item 7: Operational implementation of new ATM automated systems and integration of the existing systems

Agenda Item 8: Other business

ii-6 **ATTENDANCE**

The meeting was attended by 56 participants from 10 States of the SAM Region Argentina, Brazil, Chile, Colombia, Ecuador, Guyana, Panamá, Paraguay, Perú, Uruguay and Venezuela, and 2 International Organizations, ARINC and IATA. The list of participants is shown in pages iii-1 to iii-11.

ii.7 **LIST OF CONCLUSIONS**

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Conclusion SAM/IG/6-1	Application of further actions to reduce the risk and risk rate resulting from the SAM ATS routes network optimisation safety plan	2-2
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Conclusion SAM/IG/6-12	Action plan for the implementation of Amendment 1 to Doc. 4444	7-3
Conclusion SAM/IG/6-13	Establishment of the Implementation Group for the New flight Plan Format	7-5

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Agenda Item 1: Follow up to Conclusions and Decisions adopted by SAM/IG Meetings

Review of the status of compliance of conclusions formulated by SAM/IG meetings and pending activities

1.1 The Workshops/Meetings of the SAM Implementation Group have timely produced a series of agreements translated into conclusions, that indicate the actions to be carried out by the Implementation Group and/or States, as well as activities assumed by the Working Groups.

1.2 During the five SAM/IG meetings carried out so far, some conclusions were formulated and a series of activities were adopted, oriented towards the implementation of different functions that will enable the Region to evolve in a sustainable manner towards the application of the global ATM operational concept.

1.3 The implementation programmes foreseen for the application of the global ATM Operational Concept in the SAM Region have been initially focused in the following:

a) SAM ATS routes network optimisation.
b) Performance Based Navigation (PBN) both for en-route, terminal area and approach areas.
c) Air Traffic Flow Management (ATFM).
d) CNS systems improvements; and
e) Automation, including the new FPL format.

1.4 In view of the above, and with the information provided by the Secretariat and States on the works carried out regarding conclusions and actions adopted, the status of compliance was updated and is shown in **Appendices A and B** to this part of the report.

APPENDIX A

STATUS OF APPLICATION OF CONCLUSIONS AND/OR TASKS ORIGINATED IN SAM/IG MEETINGS

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
1. ATS Routes Implementation							
1-1	That States examine: a) Impact of RNAV routes implementation in t he airspace b) Aircraft fleet c) Air traffic services, and d) Establish pertinent coordination so as to enable integrated, harmonious and timely implementation of more direct RNAV routes.	Analyse airspace Evaluate national and international fleet Evaluate ATS Coordinate with authorities involved Coordinate with adjacent States, if necessary	Adequate information will be available to execute PBN action plan. A new ATS routes network will be available, based on RNAV with necessary PBN values, so as to respond to current requirements of airspace users	SAM/IG/7	States	RO/ATM RO/AIM	Valid
1-2	Route RNAV VOR CRR/VOR FNO (UM 661)	Coordinate the implementation. Issue AIC. Train personnel. Amend CAR/SAM ANP	Route implemented	TBD Information from Brazil is pending	States Secretariat	RO/ATM RO/AIM	Completed

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
1-3	UM 662 Guayaquil – Madrid	Coordinate the implementation. Issue AIC. Train personnel. Amend CAR/SAM ANP	Route implemented	Agreement with FAV Venezuela is pending	States Secretariat	RO/ATM RO/AIM	**Valid** (see Agenda Item 2)
		Coordinate the implementation. Issue AIC. Train personnel. Amend CAR/SAM ANP	Route implemented	Implementation agreement on 24 September 2009	States Secretariat	RO/ATM RO/AIM	**Completed** 24/09/09
1-5	Santiago-Miami	Coordinate the implementation. Issue AIC. Train personnel. Amend CAR/SAM ANP	Route implemented	Finalise coordination with States involved and IATA	States IATA Secretariat	RO/ATM RO/AIM	**Completed** Appendix A to Agenda Item 2, was modified. An analysis will continue within the SAM ATS routes network optimization programme.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
2. Optimisation of ATS routes in the SAM Region							
2-1	**Conclusion SAM/IG/3-1 ATS Route Network Optimising in the South American Region** That the ICAO SAM States take relevant action to follow the guidelines and meet the target dates established in the ATS Route Network Optimising Programme in the South American Region that appears in Appendix B to this part of the report. (Action adopted in SAM/IG/2) Optimize the airspace structure, reorganizing the red or implementing new routes based on strategic objectives of the airspace, taking into consideration "airspace modelling", ATC simulations (accelerated time and/or real time), life trials, etc.	See action plan from the ATS routes network optimisation programme (Appendix B, Attachment 1 to SAM/IG/3 Meeting Report on Agenda Item 2)	Optimised ATS routes network	As per action plan	States RLA/06/901 IATA Regional Office	RO/ATM RO/AIM	**Completed** Conclusion and action adopted in SAM/IG/2 are oriented towards achieving the same results. The Action plan was updated (see Appendix B on Agenda item 2 of SAM/IG/4.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
2-2	Prepare the preliminary evaluation of airspace safety	Collect necessary data. Carry out safety assessment applying the methodology adopted.	PBN will be implemented showing that agreed safety levels will be kept or maintained	SAM/IG/6	CARSAMMA	RO/ATM	**Completed** The SAMRA Workshop was carried out with the assistance of an expert.
2-3	Flexibility in special use airspace.	ANSPs will Establish coordination mechanism with military authorities Discuss matters such as location, altitudes, and validity periods of special use airspaces.	Obtain the efficient use of the airspace in terms coordinated and agreed between civil and military authorities, contemplating the benefit of all users	SAM/IG/7	States	N/A	**Valid** A SAM civil/military coordination Seminar/ Workshop will be required for 2011. A SAM civil/military seminar/ workshop will be required for 2011.
2-4	Handling of air transport environmental problems	Obtaining of objective data over benefits that will be reached in terms of reduction of harmful gas emissions into the atmosphere.	Known data Availability of information required for monitoring of environmental protection.	SAM/IG/6	States	N/A	**Valid.** Check fuel savings estimate chart.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
2-5	Prepare a measurable plan of performance, including gas emissions safety, efficiency, etc.	Check available tools to carry out this task Prepare a measurable plan	A measurable plan will be available which will permit a clear vision of the current and future status of performance regarding gas emissions, safety and efficiency	SAM/IG/9	RLA/06/901	RO/ATM	**Valid.** This task was included in the optimisation programme of the action plan.
2-6	**Conclusion SAM/IG/3-2 Data Collection** That SAM States: a) collect data on all flights carried out in the SAM Region upper airspace (FL 245 or above) in national and international routes in the period **1-31 July 2009** and send them to the SAM Regional Office before **30 September 2009.** b) use a sample consistent with the **form and the instructions for completing the form**, contained in **Attachment 2 to Appendix B** to this part of the report, using the EXCEL format.	The Secretariat should send a letter to States States should collect information as agreed. States should send information to the Regional Office. Information received must be assessed	A data base containing – - movement in ATS routes per FIR - movement between pairs of cities, - peak hours - movement in TMA - FL most used - air operators and type of aircraft used.	SAM/IG/5	Regional Office States RLA/06/901	RO/ATM RO/AIM CARSAMMA	**Completed** Letter LT 2/3A.13-LN 3/24.6.1-SA364 dated 8 June 2009 Except for French Guyana and Suriname, all States replied this survey.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
2-7	Determine entry/exit points of main TMAs in the SAM Region	States shall determine entry/ exit points of main TMAs Shall present information at SAM/IG/4	Adequate information will be available to prepare Version 1 of ATS routes network	SAM/IG/4	States	RO/ATM	**Completed** States informed that they will not carry out changes in their TMA. Except Brazil and Guyana shall reply on March 2010.
2-8	Determine and obtain necessary tools for the development of Version 1 of routes network (aeronautical charts, specific software)	Evaluate necessary tools	Basic elements will be available for the development of Version 1 of ATS routes network	SAM/IG/6	SAM PBN RLA/06/901	RO/ATM	**Completed** The ATSRO/2 was held in August 2010 and the proposal for amendment is presented in WP/06.
2-9	Interphase between ATS routes network of the CAR and SAM Regions	Evaluate interphase options in the ATS routes network in the CAR and SAM Regions	Develop Version 1 of ATS routes network to respond to users requirements	SAM/IG/5	SAM PBN TF Regional Office	RO/ATM	**Completed**

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
2-10	Carry out a detailed study of the ATS routes network, with a view to prepare Version 1 of routes network (ref 2.2.2 of the Action plan of the ATS routes optimization programme of the SAM Region.	Carry out a workshop among SAM experts, in order to review and validate the study of item 2.2.5 of the action plan of the ATS routes optimization programme of the SAM Region.	Initial draft of proposal Version 1 of routes network ready	March 2010	RLA/06/901 Regional Office IATA	RO/ATM	**Completed**
2-11	Prepare safety assessment required applying a qualitative methodology through the use of SMS (Ref 2.2.3 of the Action Plan – Programme for optimisation of the ATS Routes Network of the SAM Region)	Carry out safety assessment	Version 1 of ATS routes network will be implemented; demonstrating that agreed safety level will be maintained or improved.	October 2010	RLA/06/901	RO/ATM CARSAMMA	**Completed**
2-12	**Conclusion SAM/IG/4-1 – SAM routes network point of contact** That SAM States designate a point of contact to support the development of task 2.2.5 of the Action Plan for optimisation of the SAM Routes Network, and send the corresponding data (email and telephone) until 31 January 2010.	Data base completed	The list of contacts will be available to coordinate ATS routes network optimisation.	SAM/IG/5	States	RO/ATM	**Completed**

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
2-13	**Ref para. 2.1 of SAM/IG/5 Report** The meeting noted the status of implementation of RNAV routes as approved by the First SAM Workshop on ATS Routes Network Optimisation (SAM ATSRO/1), as well as other routes that were reviewed and agreed to implement during bilateral or multilateral meetings**.**	Deliver information to process ANP amendment.	ANP amendment with Version 01 of the ATS routes network processed.	August 2010	States	RO/ATM	**Completed** The meeting was carried out as programmed and the amendment is being processed to circulate it among States and international organizations (See 2-8).
2-14	**Ref Para. 2.7 SAM/IG/5 Report** Also, the meeting agreed that the routes that have not been included in Version 01, will be part of Version 01, to be dealt with during the Second SAM Workshop on ATS Routes Network Optimisation (SAM ATSRO/2).	Routes not agreed on time will be incorporated into Version 02 of the routes network	Version 01 of the ATS routes network finalised. Version 02 of the routes network in process of revision	August 2010	States	RO/AIM RO/ATM	**Completed** ATS routes network that were not coordinated or that required further coordination were transferred to Version 02 of the ATS routes network.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
2-15	**Ref Para. 2.8 SAM/IG/5 Report** The following routes be implemented in advance, since these routes have been coordinated for several years. UM661: UM532, UM403, Lima/Miami, UM662; UM400.	Implement route as agreed	Implemented routes	August 2010	States	RO/AIM RO/ATM	**Completed** Mentioned routes were implemented or incorporated in Version 01.
2-16	**Ref Para. 2.10 SAM/IG/5 Report** Coordination for ATS routes should be carried out in a bilateral or multilateral manner among involved; the use of e-mails is recommended for the exchange of information and other communication tools, such as Skype or similar, among focal points.	Previously coordinate ATS routes trajectory among parties involved.	ATS routes presented to implement, realign or eliminate are duly coordinated and ready to be introduced in the respective amendments.	2012	States and Focal points	RO/AIM RO/ATM	**Valid** Not in all cases all ATS routes presented may be previously coordinated among States involved.
2-17	**Ref. para. 2.13 SAM/IG/5 Report.** Update letters of operational agreement (LOAs) and ATS Contingency Plans	Review and coordinate with adjacent States and contingency plans	LOAs agreed before the implementation of new ATS routes, contingency plans duly updated	2012	States and Focal points	RO/AIM RO/ATM	**Valid** Most of the States have LOAs and contingency plans duly updated.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3. Implementation of Performance Based Navigation (PBN) in the SAM Region							
3-1	**SAM/IG/1-1 CAR/SAM PBN Roadmap** That ICAO SAM States, in implementing RNAV/RNP, take the pertinent actions to follow guidelines contained in the CAR/SAM PBN Roadmap as shown in Appendix C to this part of the report.	Shall facilitate implementation at a regional level Each State should comply with the actions agreed in the PBN Roadmap	States will have a National en-route, TMA and APP PBN implementation Plan.	SAM/IG/3	States	N/A	**Completed.** States adopted the PBN roadmap.
3-2	**Conclusion SAM/IG/2-1 PBN implementation Programme for en-route operations** That the ICAO SAM States take appropriate actions to follow the guidelines and comply with the targets established in the PBN implementation for en-route operations, which is shown in **Appendix B** to this part of the Report.	Execution of the action plan	RNAV 5 Implemented in the SAM Region	22 September 2011	PBN focal points of the States.	RO/ATM	**Valid.**

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3-3	**Conclusion SAM/IG/2-4 PBN Implementation Model for TMA and Approach** That States/Territories and International Organizations use the PBN Implementation Model for TMA and Approach in the preparation of their PBN implementation programmes for TMA and Approach, shown in **Appendix E** to this part of the Report.	Prepare action plans for PBN implementation in TMA and approach	Action plans accompanying regional implementation	SAM/IG/7	PBN focal points of the States	RO/ATM	Valid.
3-4	Evaluate regulations for the use of GNSS, and if such were the case, proceed to its publication	Review information available.	All SAM States with regulations for the use of GNSS available	SAM/IG/3	Secretariat	RO/CNS	Completed

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3-5	**Conclusion SAM/IG/3-3 PBN Implementation National Plans** That States of ICAO South American Region, present their PBN Implementation National Plans to SAM/IG/4 Meeting, using PBN Implementation Plan Model, shown in Appendix B of this part of the Report, as well as using the action plan models and information contained PBN Implementation Project TMA Operations and Short Term Approximations of SAM Region, approved by SAM/IG/2 Meeting.	Prepare national PBN plans	All SAM States will have a PBN implementation plan aligned with the regional PBN plan	SAM/IG/7	States	RO/ATM	**Valid** 10 States in the SAM Region presented their national PBN plan for its harmonization. It is expected that the 4 remaining States send their national plans as soon as possible.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3-6	**Conclusion SAM/IG/2-3 Survey on the Fleet Navigation Capacity** That States conduct a survey on the fleet navigation capacity, using, to that end, the form contained in **Appendix D** to this part of the Report, and send the information collected to the ICAO South American Regional Office, on the following dates: a) Aircraft operating commercial flights, which have more than 5 700 kg. of MTOW – 15 February 2009 b) Aircraft operating commercial flights, which have less than 5 700 kg. of MTOW – 15 May 2009; c) Other aircraft registered in the Region – 15 August 2009.	States must carry out this survey. Secretariat should upload Form of SAM/IG/2 Appendix 2 on Agenda item 2.	Fleet navigation capacity flying in the SAM Region	It was re-programmed and unified the date for delivery of literals a), b) and c) until 31 July 2009	Focal points designated by States RO	RO/ATM RLA/99/901 RO/FLS RO/ATM RLA/99/901 RO/FLS	**Superseded** By Conclusion SAM/IG/4-3

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3-7	Analyse aircraft fleet navigation capacity	Prepare data base	Aircraft fleet capacity analysed	SAM/IG/4	RLA/99/901	RO/ATM RLA/99/901 RO/FLS	**Completed** Regarding a) Pending b) and c).
3-8 Prev. 2-13	Collect air traffic data to understand air traffic flows in a specific airspace.	States shall collect air traffic flow data	States will have a clear view of the type of traffic operating in a specific airspace	SAM/IG/4	States PBN focal points	RO/ATM RO/AIM	**Completed**
3-9	Analyse communications, navigation means and surveillance (VOR, DME) ground to attend navigation specifications and reverse navigation	Prepare a CNS data base	Navigation specification and reverse navigation mode	SAM/IG/6	Regional Office SIP RLA/06/901	RO/CNS	**Valid.** CNS Task A partial report was presented at SAM/IG/4. Coverage will be contemplated at FL250 A workshop will be carried out by experts in order to obtain this information

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3-10	Design procedures training - RNP Approach with required authorization (AR)	Prepare SIP to have FAA instructors	Experts from States duly qualified in RNP, APCH AR matters	SAM/IG/4	Regional Office SIP RLA/06/901	Brazil/Chile RO/ATM	**Completed.** RNAV/RNP courses were dictated: RNAV/RNP and ARNP AR APCH. Brazil and Chile provided the instructors. Support was obtained from a SIP and from Regional Project RLA/06/901 for the participation of the students.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3-11	**Conclusion SAM/IG/2-2 Initial AIC** That States of ICAO SAM Region using as model the AIC presented in Appendix C to this part of the Report: a) publish in the AIRAC date of 9 April 2009 an Aeronautical Information Circular (AIC) informing the aeronautical community on their intention to implement RNAV 5 on 18 November 2010; b) reflect in this AIC the specific situations within the airspace under their jurisdiction.	Prepare AIC Publish AIC	Aeronautical community duly informed on States plans for RNAV 5 implementation.	SAM/IG/6	States	RO/ATM RO/AIM	**Partially implemented:** at 23 October 2009, French Guyana, Guyana, Panama, Suriname had not implemented yet. Implementation postponed for 22 September 2011. States must publish **a new AIC before 18 November 2010.**
3-12	**Ref. para. 3.9 of SAM/IG/5 Report** Develop an AIP Supplement model containing applicable standards and procedures, including the corresponding flight contingencies	Request RLA/06/901 to estimate hiring of an expert for the preparation of the SUPP AIP Model	SUPP AIP Model available to be used as reference by SAM States	SAM/IG/6	RLA/06/901	RO/ATM	**Completed** SUPP AIP Model was prepared and submitted for consideration of the meeting through WP/08.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3-14	**Ref. 3.11 of SAM/IG/5 Report.** Develop a training and documentation programme for air traffic controllers and AIS operators	Request RLA/06/901 to estimate hiring of an expert for the preparation of the Amendment to Doc 7030.	Regional documentation duly approved	SAM/IG/6	RLA/06/901	RO/ATM	**Completed** Amendment to Doc 7030, Regional Supplementary Procedures was prepared and has been circulated among States and submitted to the consideration of the meeting through WP/08.
3-15	**Conclusion SAM/IG/5 - Training programme and documentation for air traffic controllers and AIS operators** That SAM States use the material shown in Appendix A to this part of the report as guidance material for air traffic controllers and AIS operators.	States should provide training required to staff in order to prepare them for implementation.	States and personnel trained for RNAV5 implementation in the dates agreed	22 September 2011	States	Focal points	**Valid.**
3-16	**Ref. 3.15 of SAM/IG/5 Report.** That the RLA/06/901 develops a post-implementation monitoring programme for en-route operations.	Develop a monitoring programme and pertinent forms to collect lateral deviation information.	Monitoring programme and corresponding forms available to be used by States.	SAM/IG/6	CARSAMMA	RO/ATM	**Completed** See WP/04.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
3-17	**Conclusion SAM/IG/5-4 Implementation of Continuous Descent Operations** That, recognizing the efficiency and environmental benefits of Continuous Descent operations, and the need to harmonize these operations in the interest of safety, States are encouraged to include the implementation of Continuous Descent operations (CDO) as part of their PBN implementation plans and to implement CDO in accordance with the ICAO CDO Manual.	States should include in their PBN programmes the CDO concept.	CDO implemented as per national requirements.	SAM/IG/8	States	RO/ATM	**Valid.**

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
4. Standards and procedures for performance based navigation operations approval							
4-1	Analyse aircraft approval requirements and operators (pilots, dispatchers, and maintenance personnel) as established in PBN manual, and develop necessary documentation. Note: See Agenda Item 3, SAM/IG/2 and SAM/IG/3 Agenda Item 4.	Develop LAR with regard to PBN approvals	Guidelines at States disposal	SAM/IG/3 SAM/IG/4	Regional Project RLA/06/901	RO/ATM RLA/99/901 RO/FLS	**Completed** In charge of RLA/99/901. CAs were completed on RNAV 10, RNAV 5, RNAV 1 and 2, Basic RNP 1, RNP APCH, RNP AR APCH and APV Baro VNAV. A new working plan has been established for the development of the CA on RNP4, RNP2 and RNP1, in progress.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
4-2	**Conclusion SAM/IG/3-4 Advisory Circulars CA 91-008, CA 91-009 and CA 91-010** That States of the SAM Region: a) use as acceptable means of compliance in aircraft approval and exploiters for RNP APCH, RNP AR APCH and APV/baro-VNAV operations, Advisory Circulars CA 91-008, CA 91-009 and CA 91-010, shown in **Appendices B, C and D,** respectively to this part of the report; and b) publish the corresponding national regulations until **5 October 2009**.	Develop the procedures related to aircraft and users approval regarding RNP, APCH, RNP AR APCH and APV/Baro-VNAV operations	National regulation ready for approval of aircraft and users	SAM/IG/4	States Regional Project RLA/06/901	RO/ATM RLA/99/901 RO/FLS	Replaced by Conclusion SAM/IG/4-2
4-3	**Conclusion SAM/IG/4-2 Advisory Circulars for Aircraft approval and operators for RNP 10 operations, RNAV 5, RNAV 1 and 2, Basic RNP 1, RNP APCH, RNP AR APCH and APV/baro-VNAV** That States of ICAO South	Publish Advisory circulars for aircraft and operators approval	Advisory circulars and Work Aids used for aircraft approval	SAM/IG/5	State	N/A	**Completed**

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
	American Region, according to the PBN implementation plans: a) use the Advisory Circulars (AC), in developing their acceptable means of compliance of approval of aircraft and operators for RNP 10 operations, RNAV 5, RNAV 1 and 2, Basic RNP 1, RNP APCH, RNP AR APCH and APV/baro-VNAV, that are shown in Appendices A1, A2, B1, B2, C1, C2, D1, D2, E1, E2, F1, F2, G1 and G2 of this part of the report; and b) that job aids of aforesaid circulars be incorporated into Inspector's manuals of Operations and airworthiness.						
4-4	**Conclusion SAM/IG/4-3 Continued data collection about PBN Fleet Capacity in the South American Region** The Meeting considered that:	Complete data collection on PBN fleet capacity in SAM	Data base available	SAM/IG/6	States	N/A	**Valid** See Conclusion SAM/IG/2-3.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
	a) efforts should be continued in order that each State, through its PBN Focal Points, conduct such actions to send, as soon as possible, information, about its PBN fleet capacity to ICAO Regional Office. The information collected by States should, as far as possible, be sent to the Regional Office in a file with Excel format. b) that each State is responsible for providing data and, as time passes, updates or further details on the submitted data should be made; c) to facilitate the updating of data, the file of the survey of each state be posted on the website of the SAM Office, in order that each State, through a code, can have access to information on its fleet , and thus can perform the update of the data entered, and send it, via						

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
	e-mail, to the Regional Office.						
4-5	**Ref Para. 3.8 of SAM/IG/5 Report.** Establish and keep up to date a record of approved aircraft and operators	Contact CARSAMMA to verify if it is possible to have available a PBN data base. Review and present form for PBN approval and cancellation of approval	Data base coordinated with CARSAMMA Form for PBN approval and cancellation of approval implemented	SAM/IG/6	CARSAMMA Secretariat	RO/ATM Expert RLA/99/901	**Completed** The form was evaluated and sent to States for its use through LT 11/30.2-SA455 dated 8 July 2010 (See WP/18).
4-6	**Conclusion SAM/IG/5-2 PBN/RNAV5 seminars for operators** That SAM States, in view of the few operators that have requested the approval, and the need to encourage them to start this process, conduct PBN seminars in which operators are informed about the corresponding approval procedures.	States must provide seminars to operators	Operators trained to comply with necessary tasks for RNAV5 implementation	SAM/IG/6	States	Focal points	**Valid** States initiated their guidance programmes to operators, task that will be maintained active.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
4-7	**Conclusion SAMIG/5-3 Data Collection** That: a) SAM States collect data on flights conducted on domestic and international routes in the upper airspace (FL 245 or above) of the SAM Region during the period 1 to 15 July 2010, and send them to the SAM Regional Office before 13 August 2010; and b) That the sample be consistent with the form and the guidelines for completing the form described in Appendix B to this part of the Report, using the Excel format.	States collect data in the indicated date	Data collected and analysed	SAM/IG/6	States	RO/ATM	**Valid** Pending evaluation of data collected to make comparison with data base for approval.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
4-8	**Conclusion SAM/IG/4-5 Prediction Program for the FDE Availability** That: a) Progress be made in the study and application of the tool AUGUR (EUROCONTROL) by the States of the region. b) Considering that AUGUR tool (EUROCONTROL), incorporates the Airports and Navaids in the SAM, it is suggested that through the Regional Office of ICAO, make contact with EUROCONTROL in order to establish the feasibility of extending the validity of calculating prediction made with the AUGUR tool for the different stages of flights, in the SAM Region. c) to establish the feasibility of extending the validity of calculating prediction made with the AUGUR tool for the different stages of flights, in the	That ICAO contact Eurocontrol, FAA and other organizations in order to evaluate application of forecast FDE tools and related procedures Evaluate the possibility to lead a forecast development programme for FDE availability	Information related with FDE availability available Regional forecasting FDE availability programme	SAM/IG/7	Regional Office	RO/CNS	**Valid** No progress has been registered.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
	SAM Region. d) Through the ICAO Regional Office, establish contact with the FAA, in order to receive guidance on the procedures for approval of a prediction program for the FDE availability and the procedures used by their operators when performing operations such as RNAV based in GNSS out of United States; and e) ICAO Regional Office evaluate the possibility to lead a development process for development of an availability forecasting FDE programme for the SAM Region for its use in all flight phases.						

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
4-9	**Conclusion SAM/IG/5-6 Application of national standards for approval of operators and aircraft for PBN operations** That the Secretariat, through their official channels, encourage those States to publish national standards for approval of operators and aircrafts for PBN operations and, in particular, for RNAV 5 navigation specification, as well as to send to the ICAO Regional Office, details on the potential capacity of their fleets, if still not done.	States must publish national standards for approval of operators and aircraft for PBN operations and send this information to the Regional Office	National standards published for its application	SAM/IG/6	States	RO/ATM	**Valid** States have finished their publishing process of the corresponding national regulations.
4-10	**Para 4.20 SAM/IG/5 Report** Course for aircraft and operators approval during 2010.	Airspace users prepared for aircraft and operators approval in PBN issues	Airspace users duly prepared for PBN approval and operators and aircraft	SAM/IG/6	RLA/99/901	RO/ATM	**Completed** Courses were provided at a regional and national level in PBN approval.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
5-1	**Conclusion SAM/IG/2-6 ATFM Roadmap** That, a) the ATFM Roadmap in **Appendix B** to this part of the Report be adopted, with the aim of providing orientation to the ATFM community with regard to ATFM applications to be implemented in the short and medium term in the SAM Region; and b) the ICAO Secretariat send the ATFM Roadmap to the GREPECAS ATFM Task Force for the analysis and actions deemed pertinent.	States must adopt ATFM Roadmap sheet and inform on the intentions to national aeronautical community	Aeronautical Community in knowledge of regional and national activities related to ATFM ATFM roadmap shall be presented to the ATFM/5 Meeting	SAM/IG/3	States ATFM Focal points ATFM Rapporteur	ATFM Rapporteur/ RO/ATM RO/AIM	**Completed.**
5-2	Carry out the tasks to be developed by Regional Project RLA/06/901. See SAM/IG/3 Report	Hire experts through Regional Project RLA/06/901	Tasks identified by the meeting to be executed by Regional Project RLA/06/901 carried out.	SAM/IG/4	RLA/06/901 Experts	JF/OQ	**Completed**
5-3	Publish initial AIC ATFM using the model prepared by SAMIG	States publish AIC	Community informed on States plans regarding ATFM		States	JF	Completed. Except for Suriname.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
5-4	ATFM Manual – First Part	Continue developing ATFM manual	States will have a manual for its harmonized application in the SAM Region	SAM/IG/4	RLA/06/901 Expert	RO/ATM RO/AIM	Completed (SAM/IG/4-WP/10)
5-5	**Conclusion SAM/IG/3-5 Runway capacity of an international airport and ATC associated sector** SAM States are encouraged to carry out at least an exercise to determine the runway capacity of an international airport and ATC sector, associated or another one selected for each State, to present the results to the SAM/IG/4 Meeting, providing the following information: a) Amount of personnel trained for the exercise b) Methodology applied c) Result of the exercise, providing the declared capacity for each runway and ATC selected sector. d) Identification of problems found in the methodology applied.	Carry out estimate capacity in an airport and its associated ATC sector	States shall put into practice the course dictated on this matter and shall obtain the necessary experience to evaluate capacity at a national level.	SAM/IG/4	States	RO/ATM	**Valid** Bolivia, Brazil, Colombia, Paraguay, Peru and Venezuela presented its preliminary exercise.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
5-6	Guidance document for the application of a common methodology for the estimation of airport capacity and ATC sectors for the SAM Region	Prepare a guidance document for the application of a common methodology for the estimation of airport capacity and ATC sectors for the SAM Region	States will have a guide for the application of a common methodology for the estimation of airport capacity and ATC sectors for the SAM Region	SAM/IG/4	RLA/06/901 Expert	JF/AO	**Completed** (SAM/IG/4-WP/05)
5-7	**Conclusion SAM/IG/4-5 Guidance for the application of a common methodology for calculating airport and ATC sector capacity** The Guidance for the application of a common methodology for calculating airport and ATC sector capacity, shown in Appendix C to this part of the report, which recommends that SAM States apply the Brazilian methodology for calculating airport and ATC sector capacity, is approved.	Use of guidelines for application of a common methodology for calculating airport and ATC sector capacity.	Calculating airport and ATC sectors capacity carried out	SAM/IG/6	States	ATFM/WG	**Completed** Guidelines were approved. SAM States have guidelines to carry out the corresponding calculation.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
5-8	**Para 5.4 SAM/IG/5 Report** Development of the second part of ATFM Manual for the SAM Region	Prepare second part of ATFM Manual	ATFM Manual improved	SAM/IG/6	RLA/06/901	RO/ATM	**Completed** With the assistance of Colombia and RLA/06/901 the ATFM manual was revised.
5-9	**Para 5.4 SAM/IG/5 Report** ATFM course	Carry out second ATFM course	Personnel from AAC trained in ATFM	SAM/IG/6	RLA/06/901	RO/ATM	**Valid** Course planned with the assistance of Brazil and Colombia for November 2010.
5-10	**Para 5.4 SAM/IG/5 Report** Workshop related with Collaboration in decision making oriented towards ATFM	Carry out CDM workshop	Personnel from AAC trained in CDM concept	SAM/IG/6	RLA/06/901	RO/ATM	**Valid** Course planned with the assistance of Brazil and Colombia for November 2010.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
5-11	**Conclusion SAMIG/5-7 ATFM Teleconferences in the SAM Region** That SAM States continue to hold weekly ATFM teleconferences between flow management units or flow management positions (FMU / FMP) to improve the exchange of information among participating States.	Implement ATFM tele-conferences	Coordination between FMU/FMP carried out	SAM/IG/6	States	RO/ATM	**Valid** Some States have participated in weekly tele-conferences but in a sporadic manner. Actions should be taken to standardise such tele-conferences.
5-12	**Para. 5.28 of SAM/IG/5 Report** The Secretariat is requested to consider in year 2011, under Project RLA/06/901, the inclusion of the Course Runway Capacity Calculation and ATC Sector, to be held in the first semester.	Request RLA/06/901 to carry out a new course on runway capacity and ATC sectors for the first semester of 2011	AAC personnel trained to carry out a runway capacity and ATC sectors	SAM/IG/8	Secretariat RLA/06/901	RO/ATM	**Valid**

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
6. Assessment of operational requirements in order to determine the implementation of communications and surveillance (CNS) capabilities improvement for en-route and terminal area operations							
6-1	**SAM/IG/1-5 - Adoption of Action Plan Models for the improvement of communications and surveillance systems for en-route and terminal area operations** When carrying out activities for the improvement of communications and surveillance systems for en-route and terminal area operations, the action plan models are to be taken into account for the improvement of ground-air, ground-ground communications and surveillance systems being presented as Appendices D, F and I to the report of this agenda item.	Action plans for the improvement of CNS systems	Improvement of the communications, navigation and surveillance systems	Jun 2010	SAM States/ Territories and ICAO SAM Regional Office	RO/CNS	**Completed** States, upon elaborating their national action plans, took under consideration the action plans for the improvement of communications, navigation and surveillance systems

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
6-2	**SAM/IG/4-7 - Drafting of pending Action Plans for the Improvement of CNS Systems to meet Short- and Medium-Term Operational Requirements for En Route and Terminal Area Operations** That the aeronautical administrations of Colombia, French Guiana and Panama draft their respective action plans for the improvement of CNS systems, following the model action plan presented at the SAM/IG/3 meeting (Appendix A to agenda item 6) and send them to the ICAO SAM Regional Office no later than 30 November 2009.	National action plan for the improvement of CNS systems	National action plan for CNS improvements	30 Nov 2009	SAM States/ Territory	RO/CNS RLA/06/901 project CNS experts	**Completed** All SAM States, with the exception of French Guiana (France) and Panama, have elaborated their action plans for the improvement of CNS systems. The action plans have been published in this Regional Office's website.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
6-3	**SAM/IG/4-8 - Updating of the Action Plans for the improvement of CNS Systems to meet Short- and Medium-Term Operational Requirements for En Route and Terminal Area Operations** That SAM States, with the aim of keeping updated the Action Plans for the improvement of CNS Systems to meet Short- and Medium-Term Operational Requirements for En Route and Terminal Area Operations, present their updated versions twice a year, if any, in the dates corresponding to the holding of SAM/IG meetings.	Updating of the national plans for the improvement of CNS systems	Updating of the action plans for SAM CNS national improvements updated	Continuous	SAM States/ Territory ICAO SAM Regional Office	RO/CNS	**Valid**

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
6-4	**SAM/IG/4-10 - AMHS interconnection between Argentina-Chile, Argentina-Peru, Brazil-Colombia, Brazil-Peru, Chile-Peru and Colombia-Peru** The respective administrations are urged to operationally interconnect AMHS between Argentina-Chile, Argentina-Peru, Brazil-Colombia, Brazil-Peru, Chile-Peru and Colombia-Peru, and that, to that end, they: a) Use the model Memorandum of Understanding (MoU) shown in Appendix B to this part of the report; b) Complete the information in the MoU, taking into account the action plan for AMHS interconnection in Appendix C to this part of the Report; c) Present the MoU to the ICAO SAM Regional Office by 15 December 2009; and d) Sign the model MoU at the SAM/IG/5 meeting.	Interconnection of AMHS	MoU for the implementation of AMHS systems between Argentina-Chile, Argentina-Peru, Brazil-Colombia, Brazil-Peru, and Colombia-Peru	15 Dec 2010	SAM States/ Territory ICAO SAM Regional Office	RO/CNS RLA/06/901 project CNS experts	**Valid** To the date of this SAM/IG/6 meeting, following MoU have been drafted: Argentina-Paraguay; Argentina-Brazil; Brazil-Paraguay; and Colombia-Peru. The following MoU have been agreed upon: Argentina-Peru; and Brazil-Peru; Argentina-Chile; Brazil-Colombia.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
6-5	Study for the regional implementation of a new communications network	Improvement in the communications systems	a) Study for a SAM ATN network b) Technical specifications for an IP ATN network	a) Jun 2011 b) Dec 2011	SAM/IG Group	RO/CNS RLA/06/901 project CNS experts	**Valid** To the date of this SAM/IG/6 meeting, the study for a SAM ATN network was presented
6-6	**Conclusion SAMIG/5-8 - Review of the SAM VOR/DME stations line-of-sight coverage database** **That the SAM States/Territory:** a) Review the information in the database delivered during the Meeting containing line-of-sight diagrams of the VOR/DME stations corresponding to their State; b) Send the comments corresponding to the database to the ICAO South American Regional Office no later tan 30 June 2010; c) Use the calculated line-of-sight coverage data as an element for the PBN operations feasibility study (RNAV 5, RNAV 1 and RNAV 2).	CNS infrastructure available with corresponding coverage	Line of site coverage at VOR/DME stations	30 Jun 2012	SAM States/ Territory ICAO SAM Regional Office	RO/CNS RLA/06/901 project CNS experts	**Completed**

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
7. Operational implementation of new ATM automated systems and integration of the existing systems							
7-1	**SAM/IG/3-8 - Preparation of specific implementation plans for the interconnection of automated systems** That States of the SAM Region start the development of specific plans for the implementation of automated systems interconnection, considering the implementation dates indicated in Regional Interconnection Plan for Automated Systems in adjacent ACCs, specified in Appendix B of this part of the Report, and information contained in the following documentation: a) Memorandum of Understanding for the implementation of automated systems interconnection between two States having adjacent ACCs, Interface Control Document (ICD) for data	Operational implementation of ATM automated systems and interconnection of automated systems installed between adjacent ACCs	Memorandum of Understanding (MoU) between SAM pairs of States for the interconnection of automated systems	2012	SAM States	RO/CNS RLA/06/901 project CNS experts	**Valid** To the date of this SAM/IG/6 meeting, 4 MoU for the interconnection of automated systems have been drafted: Argentina-Brazil; Argentina-Uruguay; Brazil-Uruguay; and Brazil.-Venezuela. The following MoU has been agreed upon: Argentina-Chile.

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
	communication between ATS dependencies in Caribbean and South American Regions (CAR/SAM ICD); b) Interface control document (ICD) for data communications between ATS units in the Caribbean and South American Regions (CAR/SAM ICD); c) System Interface Control Document (SICD); and d) Regional interconnection initial plan for ACC automated systems. e) Preliminary reference system/ subsystem specification for the air traffic control automation system (SSS).						

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
7-2	**SAM/IG/4-11 - Action plan for the implementation of Amendment 1 to Doc. 4444** That SAM States, taking into account the actions indicated in the strategy document for the implementation of Amendment 1 to ICAO PANS ATM, 15th Edition (Doc. 4444), contained in Appendix D to this part of the Report, draft their respective action plans for the implementation of the amendment, and send them to the ICAO SAM Regional Office by 30 March 2010, for their presentation at SAM/IG/5 Meeting.	Implementation of the new flight plan format	National Action plans for implementation of Amendment 1 to the 15th Edition of the PANS ATM (Doc 4444).	30 Nov 2012	SAM States	RO/CNS RLA/06/901 project CNS experts	**Valid** To the date of the SAM/IG/6 meeting, the following States have drafted action plans for the implementation of Amendment 1: Argentina, Brazil, Chile, Guyana, Panama, Paraguay, Peru, Uruguay and Venezuela

No.	Task to be developed	Specific tasks	Deliverables	Finalization date	Responsible	Supporting members to the task	Status of implementation
7-3	**Conclusion SAM/IG/5-9 - Analysis on the impact of Amendment 1 to the PANS/ATM on the automated systems** That the SAM States, through their national committees, take into account the contents of Appendix B, with views that it serve as reference for an initial analysis on the impact it will have on the automated systems involved in the flight plans process, in view of the implementation of the new flight plan format in accordance with Amendment 1 to the PANS/ATM, and that they send the results to the ICAO SAM Regional Office by 30 August 2010, for their presentation at the Seminar/Workshop for the Implementation of Amendment 1 to the 15th Edition of the a PANS/ATM, to be held in Lima from 13 to 15 September 2010.	Implementation of the new flight plan format	Analysis to the impact of the implementation of the new FPL on automated systems	30 Aug 2010	SAM States/ Territory	RO/CNS RLA/06/901 project CNS experts	**Completed**

APPENDIX B

FOLLOW-UP OF CONCLUSIONS AND PENDING TASKS OF THE SAM/IG MEETING

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
1-1 **SAM/IG/1-1** **CAR/SAM PBN Roadmap** That ICAO SAM States, in implementing RNAV/RNP, take the pertinent actions to follow guidelines contained in the CAR/SAM PBN Roadmap as shown in **Appendix C** to this part of the report.	**YES**	**YES**	**YES**	**YES**	**YES**	**OG**	**--**	**YES**	**OG**	**YES**	**OG**	**YES**	**YES**	**YES**	**PER:** Dec 2009
1-1 That States examine: a) Impact of RNAV routes implementation in t he airspace Aircraft fleet, Air traffic services, and b) Establish pertinent coordination so as to enable integrated, harmonious and timely implementation of more direct RNAV routes.	**OG**	**OG**	**OG**	**YES**	**OG**	**OG**	**--**	**OG**	**OG**	**OG**	**OG**	**OG**	**YES**	**YES**	**COL:** June **ECU**: Local coordination with corresponding area. **PAR:** SAMIG 5 **PER**: Dec 2009 **VEN:** Mar.2010
2-1 Implementation of RNAV routes	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**--**	**YES**	**YES**	**YES**	**OG**	**YES**	**YES**	**OG**	**ECU:** Missing pronouncement of **VEN** in regard of the effective date for the implementation of the route Guayaquil / Madrid**.** **PER:** Chile and Peru in agreement with the part corresponding to their FIRs. RNAV5 Nov 2010.

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
2-3 **Conclusion SAM/IG/2-1 PBN implementation Programme for en-route operations** That the ICAO SAM States take appropriate actions to follow the guidelines and comply with the targets established in the PBN implementation for en-route operations, which is shown in **Appendix B** to this part of the Report.	**YES**	**YES**	**YES**	**YES**	**YES**		--	**YES**	**YES**	**YES**	**OG**	**YES**	**YES**	**YES**	**PER**: Nov 2010
2-10 **Conclusion SAM/IG/2-2 Initial AIC** That States of ICAO SAM Region using as model the AIC presented in Appendix C to this part of the Report: a) publish in the AIRAC date of 9 April 2009 an Aeronautical Information Circular (AIC) informing the aeronautical community on their intention to implement RNAV 5 on 18 November 2010; b) reflect in this AIC the specific YEStuations within the airspace under their jurisdiction.	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	--	**YES**	**OG**	**YES**	**YES**	**OG**	**YES**	**YES**	**GUY:** Nov. 2009 **SUR:** Will inform Nov.15,2009

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
2-12 **Conclusion SAM/IG/2-3** **Survey on the Fleet Navigation Capacity** That States conduct a survey on the fleet navigation capacity, using, to that end, the form contained in **Appendix D** to this part of the Report, and send the information collected to the ICAO South American Regional Office, on the following dates: a) Aircraft operating commercial flights, which have more than 5 700 kg. of MTOW – 15 February 2009; b) Aircraft operating commercial flights, which have less than 5 700 kg. of MTOW – 15 May 2009; c) Other aircraft registered in the Region – 15 August 2009.	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**--**	**YES**	**OG**	**OG**	**YES**	**OG**	**YES**	**YES**	**PAR**: completed a) pending b) and c).
2-13 1.2 1.2 Collect air traffic data to understand air traffic flows in a specific airspace	**YES**	**NO**	**YES**	**YES**	**YES**	**YES**	**--**	**YES**	**OG**	**YES**	**YES**	**YES**	**YES**	**YES**	**PER**: carried out Jul 2009. Delivered to SAM Office.
2-14 **Conclusion SAM/IG/2-4** **PBN Implementation Model for TMA and Approach** That States/Territories and International Organizations use the PBN Implementation Model for TMA and Approach in the	**YES**	**OG**	**OG**	**YES**	**YES**	**OG**	**--**	**YES**	**OG**	**YES**	**OG**	**OG**	**YES**	**OG**	**ECU**: Developing **PER:** SAM/IG/4 **SUR**: Nov.15, 2009 **VEN**: March 2010

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
preparation of their PBN implementation programmes for TMA and Approach, shown in **Appendix E** to this part of the Report															
2-15 Flexibility in special use airspace.	**OG**	**OG**	**YES**	**YES**	**OG**	**OG**	**--**	**OG**	**N/A**	**OG**	**YES**	**OG**	**YES**	**OG**	**CHI:** They have a committee responsible for these subjects **ECU:** Will require information at SAM/IG/3 **PAN:** Panama does not have army nor air force. PER: Implemented since 2001 **VEN:** Undetermined
2-16 Handling of air transport environmental problems	**OG**	**NO**	**OG**	**YES**	**NO**	**NO**	**--**	**OG**	**OG**	**OG**	**OG**	**OG**	**YES**	**NO**	**BOL:** SAMIG/6 **ECU**: Example: Chile SAM/IG/5 **PER**: SAM/IG/5

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
3-1 **Conclusion SAM/IG/2-5 Advisory Circular CA 91-002 and** **Job Aid for Aircraft and operators** **RNAV 5 operational *approval*** That States of ICAO South American Region: a) Use as an acceptable compliance source in aircraft and operators RNAV 5 operational approval Advisory Circular CA 91-002 and Job Aid for Aircraft and operators RNAV 5 operational approval, presented in **Appendices A** and **B**, respectively, to this part of the Report. b) Publish respective national regulations up to April 2009.	**YES**	**NO**	**OG**	**OG**	**YES**	**OG**	**--**	**OG**	**OG**	**NO**	**OG**	**OG**	**YES**	**OG**	**BRA and PAN:** publication is being harmonized with CA LAR **CHI:** official information pending 1 Nov 2010 **ECU**: Coord. with OPS **PAR:** signature pending Oct. 2010 **PER**: Dec 2009

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
3.5 **Conclusion SAM/IG/3-3** **PBN Implementation National Plans** That States of ICAO South American Region, present their PBN Implementation National Plans to SAM/IG/4 Meeting, using PBN Implementation Plan Model, shown in Appendix B of this part of the Report, as well as using the action plan models and information contained PBN Implementation Project TMA Operations and Short Term Approximations of SAM Region, approved by SAM/IG/2 Meeting.	**YES**			**YES**						**YES**			**YES**	**YES**	**VEN:** finalised and delivered.
4-2 **Conclusion SAM/IG/2-6** **ATFM Roadmap** That, a) the ATFM Roadmap in **Appendix B** to this part of the Report be adopted, with the aim of providing orientation to the ATFM community with regard to ATFM applications to be implemented in the short and medium term in the SAM Region; and b) the ICAO Secretariat send the ATFM Roadmap to the GREPECAS ATFM Task Force for the analyses and actions deemed pertinent	**OG**	**OG**	**YES**	**YES**	**YES**	**OG**	**--**	**OG**	**OG**	**YES**	**OG**	**OG**	**YES**	**YES**	**ECU:** ATFM **PER:** Dec.2009 **VEN:** Jul.2010

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
4-5 INITIAL ATFM AIC Model	**YES**	**YES**	**N/A**	**OG**	**YES**	**YES**	**--**	**YES**	**OG**	**YES**	**YES**	**OG**	**YES**	**YES**	**BRA:** information published in the AIP. **GUY**: 22 Oct 2009
Conclusion SAM/IG/3-1 ATS Route Network Optimising in the South American Region That the ICAO SAM States take relevant action to follow the guidelines and meet the target dates established in the ATS Route Network Optimising Programme in the South American Region that appears in Appendix B to this part of the report.				**YES**						**YES**				**YES**	**VEN:** pertinent actions taken
Conclusion SAM/IG/3-4 Advisory Circulars CA 91-008, CA 91-009 and CA 91-010 That States of the SAM Region: a) use as acceptable means of compliance in aircraft approval and exploiters for RNP APCH, RNP AR APCH and APV/baro-VNAV operations, Advisory Circulars CA 91-008, CA 91-009 and CA 91-010, shown in Appendices B, C and D, respectively to this part of the report; and b) publish the corresponding national regulations until 5 October 2009.	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
Conclusion SAM/IG/3-5 Runway capacity of an international airport and ATC associated sector SAM States are encouraged to carry out at least an exercise to determine the runway capacity of an international airport and ATC sector, associated or another one selected for each State, to present the results to the SAM/IG/4 Meeting, providing the following information: a) Amount of personnel trained for the exercise b) Methodology applied c) Result of the exercise, providing the declared capacity for each runway and ATC selected sector. d) Identification of problems found in the methodology applied.	**OG**		**YES**	**OG**	**YES**	**YES**				**YES**			**NO**	**YES**	**ECU:** has trained personnel and calculation Quito and Guayaquil airports **PAR**: has trained personnel and Airport calculation in Asunción airport. **VEN:** exercise requested was made, personnel from Venezuela has participated in ATFM training workshops
Conclusion SAM/IG/4-1 – SAM routes network point of contact That SAM States designate a point of contact to support the development of task 2.2.5 of the Action Plan for optimisation of the SAM Routes Network, and send the corresponding data (email and telephone) until 31 January 2010.	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**URU:** Adriana San Germán Tel. 598 26040408 Int. 5204 asangerman@gmail.com
Conclusion SAM/IG/4-2 Advisory Circulars for Aircraft approval and operators for RNP 10 operations, RNAV 5, RNAV 1 and 2, Basic	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
RNP 1, RNP APCH, RNP AR APCH and APV/baro-VNAV That States of ICAO South American Region, according to the PBN implementation plans: a) use the Advisory Circulars (AC), in developing their acceptable means of compliance of approval of aircraft and operators for RNP 10 operations, RNAV 5, RNAV 1 and 2, Basic RNP 1, RNP APCH, RNP AR APCH and APV/baro-VNAV, that are shown in Appendices A1, A2, B1, B2, C1, C2, D1, D2, E1, E2, F1, F2, G1 and G2 of this part of the report; and b) that job aids of aforesaid circulars be incorporated into Inspector's manuals of Operations and airworthiness.														
Conclusion SAM/IG/4-3 Continued data collection about PBN Fleet Capacity in the South American Region The Meeting considered that: a) efforts should be continued in order that each State, through its PBN Focal Points, conduct such actions to send, as soon as	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
possible, information, about its PBN fleet capacity to ICAO Regional Office. The information collected by States should, as far as possible, be sent to the Regional Office in a file with Excel format. b) that each State is responsible for providing data and, as time passes, updates or further details on the submitted data should be made; c) to facilitate the updating of data, the file of the survey of each state be posted on the website of the SAM Office, in order that each State, through a code, can have access to information on its fleet , and thus can perform the update of the data entered , and send it, via e-mail, to the Regional Office.															
Conclusion SAM/IG/4-5 – Guidance for the application of a common methodology for calculating airport and ATC sector capacity The Guidance for the application of a common methodology for calculating airport and ATC sector capacity, shown in Appendix C to this part of the report, which recommends that SAM	**YES**		**YES**	**YES**	**YES**	**NO**				**YES**	**YES**		**YES**	**OG**	**VEN:** there is no sufficient personnel yet to comply this task in 100%, currently working on data collection.

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
States apply the Brazilian methodology for calculating airport and ATC sector capacity, is approved.															
Conclusion SAM/IG/4-11 Action plan for the implementation of Amendment 1 to Doc. 4444 That SAM States, taking into account the actions indicated in the strategy document for the implementation of Amendment 1 to ICAO PANS ATM, 15th Edition (Doc. 4444), contained in Appendix D to this part of the Report, draft their respective action plans for the implementation of the amendment, and send them to the ICAO SAM Regional Office by 30 March 2010, for their presentation at SAM/IG/5 Meeting.															

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
Conclusion SAM/IG/5-1 Training programme and documentation for air traffic controllers and AIS operators That SAM States use the material shown in Appendix A to this part of the report as guidance material for air traffic controllers and AIS operators.	**OG**			**YES**	**OG**			**OG**		**YES**			**OG**	**YES**	**VEN:** final training phase at the IUAC
Conclusion SAMIG/5-2 PBN/RNAV5 seminars for operators That SAM States, in view of the few operators that have requested the approval, and the need to encourage them to start this process, conduct PBN seminars in which operators are informed about the corresponding approval procedures.	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	**OG**	

Conclusion SAMIG/5-3 Data Collection That: a) SAM States collect data on flights conducted on domestic and international routes in the upper airspace (FL 245 or above) of the SAM Region during the period 1 to 15 July 2010, and send them to the SAM Regional Office before 13 August 2010; and b) That the sample be consistent with the form and the guidelines for completing the form described in Appendix B to this part of the Report, using the Excel format.	**YES**			**YES**	**NO**			**OG**		**YES**			**YES**	**YES**	**Guyana** sent 1-5 July. 1-15 will be sent by 31st October 2010 **VEN**: sent to the regional office and delivered during SAM/IG/6 Meeting

Conclusion SAM/IG/5-4 Implementation of Continuous Descent Operations That, recognizing the efficiency and environmental benefits of Continuous Descent operations, and the need to harmonize these operations in the interest of safety, States are encouraged to include the implementation of Continuous Descent operations (CDO) as part of their PBN implementation plans and to implement CDO in accordance with the ICAO CDO Manual.	**OG**			**OG**	**OG**			**OG**		**YES**			**YES**	**OG**	**GUY:** Manual under review

Conclusion SAM/IG/5-5 Prediction Program for the FDE Availability That: a) Progress be made in the study and application of the tool AUGUR (EUROCONTROL) by the States of the region. b) Considering that AUGUR tool (EUROCONTROL), incorporates the Airports and Navaids in the SAM, it is suggested that through the Regional Office of ICAO, make contact with EUROCONTROL in order to establish the feasibility of extending the validity of calculating prediction made with the AUGUR tool for the different stages of flights, in the SAM Region. c) Through the ICAO Regional Office, establish contact with the FAA, in order to receive guidance on the procedures for approval of a prediction program for the FDE availability and the procedures used by their operators when performing operations such as RNAV based in GNSS out of United States; and	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	

d)ICAO Regional Office evaluate the possibility to lead a development process for development of an availability forecasting FDE programme for the SAM Region for its use in all flight phases														
Conclusion SAM/IG/5-6 Application of national standards for approval of operators and aircraft for PBN operations That the Secretariat, through their official channels, encourage those States to publish national standards for approval of operators and aircrafts for PBN operations and, in particular, for RNAV 5 navigation specification, as well as to send to the ICAO Regional Office, details on the potential capacity of their fleets, if still not done.	**YES**				**YES**			**OG**		**OG**			**YES**	**YES**	**Guyana** does not have a national fleet; however efforts to develop and publish national standards are on going. **VEN:** available at the website: www.inac.gob.ve
Conclusion SAMIG/5-7 ATFM Teleconferences in the SAM Region That SAM States continue to hold weekly ATFM teleconferences between flow management units or flow management positions (FMU / FMP) to improve the exchange of information among participating States.	**YES**	**YES**	**YES**	**YES**	**YES**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**NO**	**YES**	**YES**	Group 1: weekly Monday 14:00 UTC Group 2: weekly Tuesday 14:00 UTC Group 3: weekly Wednesday 14:00 UTC Brazil-Venezuela: daily 15:00 UTC Date 06-12-2010 **Guyana** not participating in teleconference **VEN:** participates actively

Conclusion SAMIG/5-8 Review of the SAM VOR/DME stations line-of-sight coverage database That the SAM States/Territory: a) Review the information in the database delivered during the Meeting containing line-of-sight diagrams of the VOR/DME stations corresponding to their State; b) Send the comments corresponding to the database to the ICAO South American Regional Office no later than 30 June 2010; c) Use the calculated line-of-sight coverage data as an element for the PBN operations feasibility study (RNAV 5, RNAV 1 and RNAV 2).	**OG**			**OG**	**NO**					**OG**			**YES**	**OG**	

Conclusion SAM/IG/5-9 Analysis on the impact of Amendment 1 to the PANS/ATM on the automated systems That the SAM States, through their national committees, take into account the contents of Appendix B, with views that it serve as reference for an initial analysis on the impact it will have on the automated systems involved in the flight plans process, in view of the implementation of the new flight plan format in accordance with Amendment 1 to the PANS/ATM, and that they send the results to the ICAO SAM Regional Office by 30 August 2010, for their presentation at the Seminar/Workshop for the Implementation of Amendment 1 to the 15th Edition of the a PANS/ATM, to be held in Lima from 13 to 15 September 2010.	**YES**			**YES**	**OG**			**OG**		**OG**			**YES**	**YES**	**VEN:** It was determine that needs updating and contacts are being made with manufacturers, only contacted to ATECH, SELEX has not presented proposal.

Instrucciones para el llenado del formulario - Instructions to fill in the form

- Cumplida: colocar **Sí** en el casillero correspondiente. / Accomplished: place **YES** in the corresponding box
- En ejecución: colocar **OG** (on going) e indicar en "observaciones" la fecha prevista de término./ In execution: place **OG** (on going) and indicate under "remarks" the estimated deadline
- No cumplida: colocar **NO** en el casillero correspondiente y, de ser el caso, hacer comentarios en columna de observaciones/ Not complied: place **NO** in the corresponding box and if such were the case, make comments in the remarks column

Agenda Item 2: Optimisation of the ATS routes

Safety plan for route optimisation (ATSRO) in the SAM Region

2.1 As a result of the aforementioned ATS routes network optimisation programme, the ICAO South American (SAM) Regional Office, with the support of Regional Project RLA/06/901, scheduled a workshop to assess the risks of the system prior to the optimisation of the ATS route network (ATSRO) of the SAM Region, in order to comply with the safety provisions of Annex 11 before introducing major changes in the aeronautical system structure. It also contemplated the participation of an expert for a period of three weeks to assist the Secretariat in the drafting of the safety case.

2.2 This workshop permitted the participation of experts in the various areas of knowledge, as well as of civil aviation authorities, air traffic service providers, pilots, operations and airworthiness inspectors, IATA and the CAR/SAM Regional Monitoring Agency (CARSAMMA). This group of experts identified the hazards that might affect or hinder optimisation, assessed the consequences in terms of likelihood and severity, as well as the tolerability of operational risks, and defined the mitigation measures required to enhance safety.

2.3 This multidisciplinary team used the risk management methodology contained in the aforementioned Safety Management Manual (Doc. 9859) for the application of safety systems (SMS). To this end, operational risks were identified, and the seven stages of the operational risk management process were used to measure safety levels.

2.4 The safety study for ATSRO starts with a brief description of the system based on the planning defined for the SAM Region and on the ATS route network optimisation programme. The purpose of this study is to determine the feasibility of the cited optimisation, based on a risk assessment, in order to ensure the safety of operations in the SAM Region within this new scope of application.

2.5 This study concluded that the level of risk concerning the optimisation of the ATS route network is acceptable and permits the use of the current network and the introduction of modifications without affecting its normal operation, thus achieving an orderly transition. Finally, recommendations and further actions to reduce the risk and resulting risk rate are made regarding its application by States and the various organisations of the Region, which will increase safety in the analysed airspace. In summary, the implementation of ATSRO in the Region is feasible, as shown by this study. In view of the above, the meeting formulated the following conclusion:

Conclusion SAM/IG/6-1 Application of further actions to reduce the risk and risk rate resulting from the SAM ATS routes network optimisation safety plan

That States, ATS providers and aircraft operators, take the necessary measures to apply recommendations and further actions in order to reduce the risk and resulting risk rate as shown in Appendix 1 to Chapter 4 of the Safety Plan for the SAM Region ATS routes network, as shown in **Appendix A** to this part of the report.

Proposal for amendment to the CAR/SAM ANP ATS routes network

2.6 The meeting revised the proposal for amendment to the CAR/SAM ANP routes network, as presented in the corresponding document. From this revision, it was concluded that all ATS routes included in the amendment are in concurrence with the agreements among States, and therefore such proposal for amendment is ready to be circulated to States and pertinent International Organisations, and be further routed to the ICAO Council for approval. The proposal for amendment is shown in **Appendix B** to this part of the report.

Aeronautical Information Publication (AIP) – ENR 3.3 Air Navigation Routes

2.7 During the revision of the Aeronautical Information Publication (AIP) – ENR 3.3 Air Navigation Routes, the meeting concluded that the table presented to the Secretariat should be modified in its column 2, since the information that contains such column would not provide any benefit to air operators or service providers and its adoption would result in a significant workload and distribution of resources to service providers. Also, a new column with the lateral limits of RNAV routes was incorporated. In view of the above, the meeting agreed to the application of a new table corresponding to part ENR 3.3 of the AIP in the SAM Region, which is attached as Appendix E to the Report on Agenda Item 3.

Revision of the action plan for the SAM Region ATS Routes Network Optimisation

2.8 The meeting made a complete revision of the action plan for the SAM Region ATS Routes Network Optimisation and made an adjustment of the tasks, as per the results reached, modifying the dates for those tasks which were still valid. The action plan revised is shown in **Appendix C** to this part of the report.

RNAV Routes presented by IATA

2.9 IATA presented for analysis and possible inclusion in Version 01 of the routes network, routes which mostly belonged to the Argentinean FIRs. The meeting took note of the progress reached by the administrations of Argentina and LAN, conforming proposals for modification of routes, in order to make them more direct, to shorter flight time and consequently diminishing the emission of contaminating gases in the atmosphere. Due to the current status of the SAM Region routes network restructuring, the Meeting recommended that such modifications be revised during phase 3 of the optimisation programme, and if appropriate, the international routes be incorporated into Version 02 of the ATS routes network optimisation programme (see **Appendix D** to this part of the report).

2.10 Also, recognising the important support by SAM States, it encouraged the corresponding civil aviation administrations to continue with the joint efforts with IATA, for the optimisation of the SAM Region airspace.

eTod and ASTER GDEM Information

2.11 The meeting to note of two presentations made by Jeppesen regarding the need for eTOD information and the perspective of the industry in this regard and on the adequate terrain information to comply with requirements of ICAO Annex 15, Chapter 10. In this connection, and taking into consideration that the information was useful to States, it was agreed to include the same as **Appendices E and F** to this part of the report.

APPENDIX A

INTERNATIONAL CIVIL AVIATION ORGANIZATION

SOUTH AMERICAN REGIONAL OFFICE

SAFETY PLAN FOR ATS ROUTE NETWORK OPTIMISATION (ATSRO) IN THE SAM REGION

Version 0.3

September 2010

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Executive Summary

1 At the request of the States and International Organizations, the ICAO regular programme in the South American Region has focused, amongst other implementation projects, on the implementation of the global plan initiatives and, particularly, on the optimisation of the airspace structure through the optimisation of the ATS route network (ATSRO) and the implementation of RNAV5.

2 As a result of the aforementioned planning, the ICAO South American (SAM) Regional Office, with the support of Regional Project RLA/06/901, scheduled a workshop for assessing the risks of the system before proceeding with the ATS Route Network Optimisation (ATSRO) in the SAM Region, in order to comply with the safety provisions of Annex 11 before introducing major changes in the aeronautical system structure.

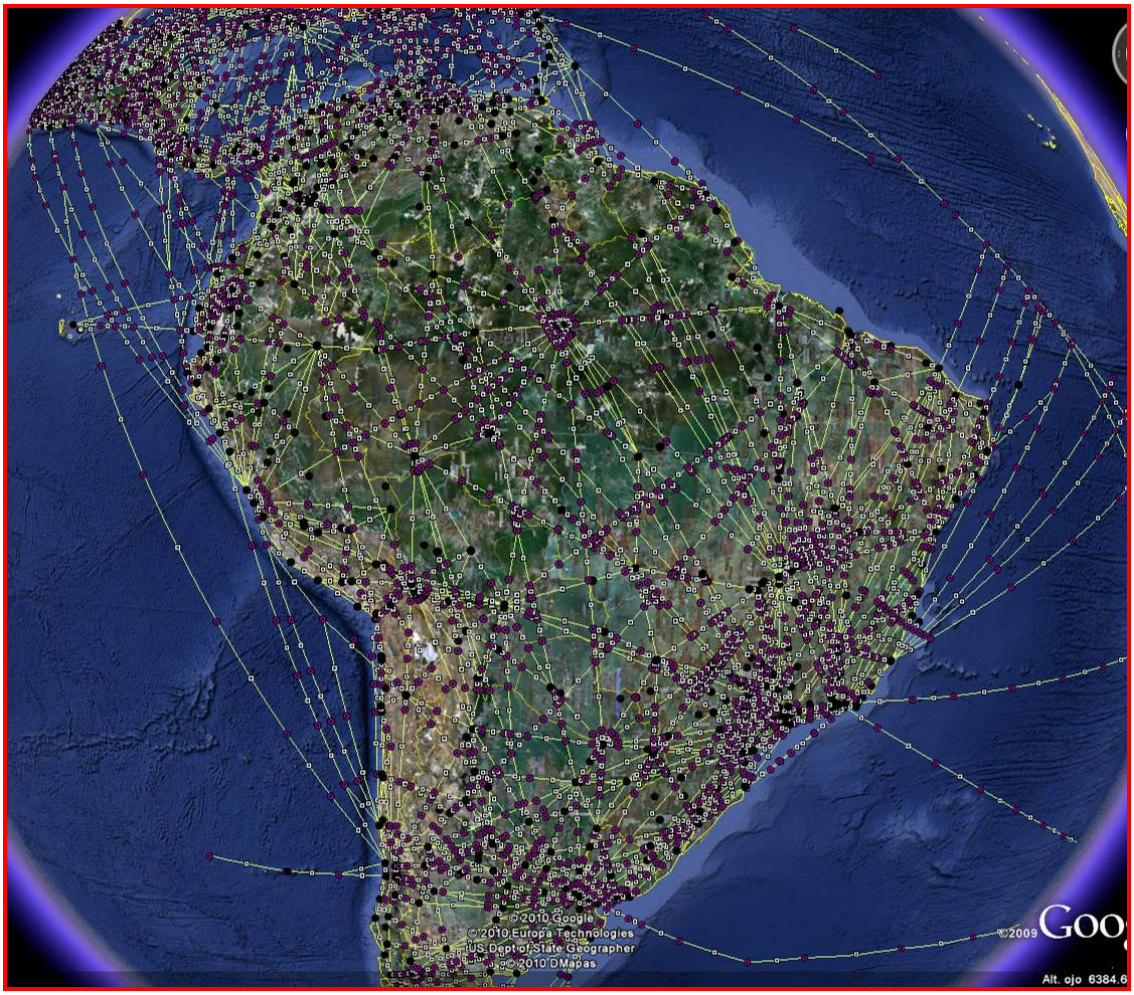
3 This workshop was attended by experts in the various areas of knowledge as well as by civil aviation authorities, air traffic service providers, pilots, operation and airworthiness inspectors, IATA and the CAR/SAM Regional Monitoring Agency (CARSAMMA). With the establishment of this group of experts, it was possible to identify the hazards that might affect or hinder optimisation, assess the consequences in terms of likelihood and severity, and the tolerability of operational risks, and defined the mitigation measures required to improve the resulting level of safety.

4 This multidisciplinary team applied the risk management methodology contained in the Safety Management Manual (Doc 9859) concerning Safety Management Systems (SMS). Accordingly, the operational risks identified were assessed, and the seven stages of the operational risk management process were applied to measure safety levels.

5 This safety study for ATSRO starts with a brief description of the system based on the planning defined for the SAM Region and on the ATS route network optimisation programme. The purpose of this study is to determine the feasibility of the aforementioned optimisation, based on a risk assessment, using the qualitative methodology described in Doc 9859 to ensure the safety of operations within this new scope of application in the SAM Region.

6 This study revealed that the level of risk related to the optimisation of the ATS route network is acceptable and permits the use of the current network and the introduction of modifications without affecting its normal operation, allowing for an orderly transition. Finally, it contains recommendations to the various stakeholders in the Region. In summary, ATSRO in the Region is feasible as shown by this study.

SAM safety case scenario



Chapter 1: Preamble

1.1 Objective

1.1.1 The purpose of this document is to make a qualitative assessment of the introduction of improvements to the ATS routes in the South American Region under the ATS Route Network Optimisation Programme (Version 1 of the ATS route network), based on a safety assessment following the guidelines established in the regional plan.

1.1.2 The implementation of Version 1 of the ATS route network requires the use of a standard methodology for the identification of hazards and the analysis of their consequences, thus permitting the management of operational risks in the optimisation of the route network (ATSRO). This assessment has been based on the provisions of the Safety Management Manual (Doc 9858).

1.1.3 Taking into account the diversity of scenarios in the SAM Region and the agreements reached at the various work meetings of the SAM implementation group, it was felt that this type of safety case study would be a complex task and should be supported by Regional Project RLA/06/901.

1.1.4 Airspace improvements contribute directly to the achievement of the following ICAO Strategic Objectives:

- **Safety —** *Enhance global civil aviation safety*
- **Environmental protection —** *Minimise the adverse effect of global civil aviation on the environment*
- **Efficiency —** *Enhance the efficiency of aviation operations*

1.2 Scope

1.2.1 The safety case study for ATSRO covers the whole SAM Region. The FIRs involved are the following: Antofagasta, Amazónica, Asunción, Barranquilla, Brasilia, Bogota, Comodoro Rivadavia, Córdoba, Curitiba, Ezeiza, Georgetown, Guayaquil, La Paz, Lima, Maiquetía, Mendoza, Montevideo, Panama, Paramaribo, Puerto Montt, Punta Arenas, Recife, Resistencia, Rochambeau and Santiago.

1.3 Background

1.3.1 During the CNS/ATM implementation process conducted by the States and the regional planning and implementation groups within the framework of the Global Air Navigation Plan for CNS/ATM Systems (Doc 9750), it was recognised that the technology was not an end in itself and that an integrated global ATM system concept, based on clearly established operational requirements, was needed. This concept, in turn, would serve as a basis for the coordinated implementation of CNS/ATM technologies, also based on clearly established requirements. In order to develop this concept, the ICAO Air Navigation Commission established the Air Traffic Management Operational Concept Panel (ATMCP).

1.3.2 In order to align global planning with the conclusions of the Eleventh Air Navigation Conference, mainly in relation to the Global ATM Operational Concept, as well as to the Industry Roadmap, ICAO began the development of the new Global Air Navigation Plan. In addition to including the Global ATM Operational Concept, the Global Air Navigation Plan focuses on a set of "Global Plan Initiatives (GPIs), providing the necessary conditions for the implementations aimed at attaining benefits for the ATM community in the near and medium term.

1.3.3 At the request of the States and International Organisations, the ICAO regular programme in the South American Region, amongst other implementation projects, has focused on the implementation of these global plan initiatives and, particularly, the optimisation of the airspace structure. In this sense, the meetings of the SAM Implementation Group (SAM/IG) are being held under the auspices of the new project RLA/06/901. One of the purposes of these meetings is the optimisation of the ATS route network (ATSRO) in the South American Region. The first two meetings of the SAM Implementation Group (SAM/IG/1 and SAM/IG/2) reviewed the current status of the route network, identifying several issues that made it difficult to attain the level of effectiveness sought through the optimisation, but which were being mitigated or eliminated, as applicable, through action taken by the SAM States and IATA.

1.3.4 The SAM States have seen the need to improve the airspace structure in order to create an inter-functional air traffic management system that is available to all users during all flight phases, and that meets the agreed safety levels, provides cost-effective operations, is environmentally sustainable and meets national security requirements.

1.3.5 In order to check if the implementation of Version 1 of the route network impaired safety, ICAO was asked to conduct a safety assessment to make sure that no elements that might affect safety were introduced. To that end, a seminar/workshop was held to identify hazards that might result from the implementation, and this document was subsequently prepared based on the information collected at that event.

Chapter 2 Description of the Air Traffic System in the SAM Region

2.1 General status of the SAM ATS route system

2.1.1 The ATS route network is part of the structure and organisation of the airspace. SAM airspace is divided into upper and lower, with a vertical boundary at FL 250. This study is applicable to the ATS route network in the upper airspace.

2.1.2 In general, the development of the SAM route network was always based on the specific requirements of isolated routes, without a global analysis that would take into account the broader operational requirements, and seeking a functional interrelationship amongst the various elements of the airspace structure, such as: ATS routes, control sectors, control areas, TMAs and others.

2.1.3 The work carried out by the States, with the support of Regional Project RLA/98/003, resulted in the implementation of 77 RNAV routes, the modification of 58 route paths, and the elimination of only 7 routes. Although the work done took into account the operational requirements of airspace users, the addition of RNAV routes to the existing airspace structure in some cases resulted in an increased airspace complexity and thus a reduction of ATC capacity.

2.1.4 There is a close relationship between the route network structure and airspace sectorisation. This relationship must be taken into account even from the planning phase in order to endorse the feasibility of a sectorisation that provides optimum ATC capacity, including ATS delegation. When defining the type of route (unidirectional/bidirectional) and the direction of unidirectional routes, the need for enhanced sectorisation efficiency may be taken into account.

2.1.5 An important aspect has been civil-military coordination, which is essential to ensure route network efficiency. Currently, there is a certain level of coordination that needs to be improved in most of the Region. The concept of a flexible use of airspace (FUA), which is essential to meet the requirements of all airspace users, is not being applied.

2.1.6 Unidirectional routes are used in part of the Region. This is a limiting factor and, except for some few cases, there is no parallel route structure with sufficient spacing between route centre lines to facilitate traffic management and increase airspace capacity. In general terms, the longitudinal separation applied in FIR boundaries is 10 minutes.

2.1.7 Currently, the route network is based on conventional and RNAV routes, where performance-based navigation (PBN) is not yet being used. The implementation of RNAV 5 is expected for late 2010.

2.1.8 In the airspace under study, air traffic services that include route control, flight information and alert services are provided. There are ground/air communications throughout the upper airspace and, to a large extent, a surveillance system is also available. The navigation structure is still based on fixed radio aids (VOR, VOR/DME) but a high percentage of the fleet has autonomous navigation systems that allow them to fly on any desired flight path within the coverage of station-referenced navigation aids, or within the limits of autonomous aids, or a combination of both.

2.1.9 There is also an aeronautical meteorology and information service that meets the standards defined in the corresponding ICAO Annexes. Likewise, all the States of the Region provide search and rescue service.

2.1.10 In case of ATS system failure, there are contingency plans that have been duly agreed upon and harmonised among all the States in the Region. In case of a partial or total interruption of the ATS system and/or related support services, these contingency plans will ensure that air operations will not be interrupted and that the main international air routes will remain open, with due consideration to the agreed safety levels.

2.2 Situation following the implementation of Version 1 of the ATS route network and RNAV 5

2.2.1 The optimisation of the SAM route network is being carried out by stages in order to obtain the corresponding operational benefits as soon as possible. It was deemed advisable to consider RNAV 5 implementation as Phase 1, the beginning of the route network optimisation programme, taking into account that it is a concept that will facilitate optimisation. This implementation phase will be executed in keeping with the SAM PBN Implementation Programme approved by the SAM/IG/2 meeting and the PBN Roadmap approved by GREPECAS. Starting in Phase 2, the route network version concept will be incorporated, taking into account that airspace structure changes as air traffic movement grows, the shifting of air traffic demand from one Region or airport to another, available technologies, amongst other aspects (see **Appendix 1 to Chapter 2**).

2.2.2 It is expected that the implementation of Phases 1 and 2 of the ATS route network optimisation will promote the necessary conditions for the introduction of substantial improvements in subsequent optimisation phases, and will harmonise the criteria for the approval of aircraft and operators for operations in RNAV routes, while providing the necessary elements for an appropriate route spacing.

2.2.3 Isolated actions by States for the development of domestic ATS route networks must be limited to airspaces that strictly serve domestic purposes. Likewise, such actions normally have a direct and noticeable effect on traffic beyond the area of jurisdiction of the State involved.

2.2.4 The use of unidirectional routes will favour the improvement of airspace structure, which leads to an increase in ATC sector capacity. Most ATS routes will be established on a permanent basis. However, there are cases in which the implementation of temporary routes, based on the existence of special use airspaces (SUA), may permit airspace structure optimisation, either reducing traffic in the main routes or allowing aircraft to fly their most convenient profiles.

2.2.5 It is expected that, during the subsequent phases of the route network optimisation programme, a protected airspace and an appropriate spacing between adjacent ATS routes will be provided. This spacing between parallel centre lines in which PBN applies will depend on the type of RNAV or RNP specified by each State, or on regional agreements, and its application will be assessed according to Doc 9689, taking into account, *inter alia*, the available ATS surveillance capacity and air traffic controller workload.

Chapter 3: Hazard Identification Process for SAM ATS Route Network Optimisation (ATSRO)

3.1 Introduction

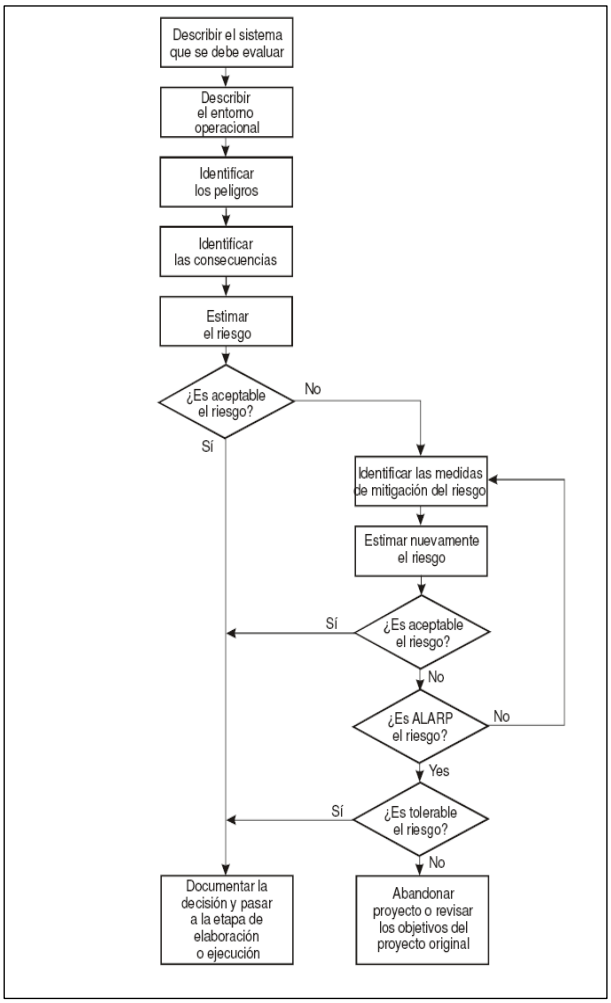
3.1.1 As seen in Chapter 1 of this document, and for the purpose of identifying hazards within the operational scope of ATSRO, a regional workshop (SAMRA/01) was scheduled with the participation of a multi-disciplinary group of experts, which are listed in **Appendix 1 to Chapter 3** of this document. This

multi-disciplinary group identified hazards and linked their consequences to ATSRO. This group of experts identified the hazards and their associated consequences, and determined their level of operational risk for the validation of ATSRO.

3.1.2 For purposes of the analysis in this chapter, hazards are defined as factors that could affect the acceptable level of safety (ALoS); for example, the modification or realignment of an airway and the optimisation of the regional route network, a new scenario involving generic hazards of a natural, technical or economic nature. The occurrence of a hazard generates consequences that affect all operational areas, such as: technical aspects, loss of separation, increase in the workload of services, and others. In the case of natural hazards defined as severe turbulence or volcanic ash, the consequences in terms of damage to aeroplane components will be immediate. Another aspect to consider is the degradation of communication systems, which affects the integrity of the ATM system. With a common understanding of the relationship between hazards and their consequences, we can move to the next stage, in which operational risks are managed, as explained in Chapter 4 of this document.

3.2 Analysis of the safety assessment process (hazard identification)

3.2.1 For the safety assessment process, it is advisable to divide it into seven stages or steps, following the guidelines contained in Doc 9859, SMM. The different activities are listed in chronological order, systematically ordering the actions that will permit the identification of hazards as follows:

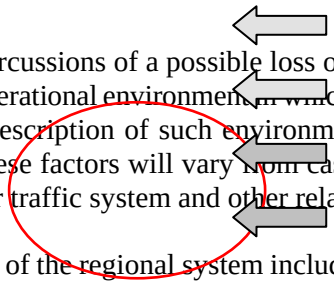


Step 1:	Drafting (or obtention) of a full description of the system to be assessed and the environment in which the system will operate
Step 2:	Identification of hazards and their consequences
Step 3:	Risk assessment, expressed in terms of likelihood
Step 4:	Risk assessment, expressed in terms of severity
Step 5:	Risk index/tolerability
Step 6:	Risk mitigation
Step 7:	Drafting of the safety assessment documents

3.2.2 The diagram below shows the safety assessment process and the possible need to repeat the process cycle until finding a satisfactory method for the identification of hazards and associate their consequences.

3.2.3 The hazard identification process can only identify hazards within the scope of the described system. Therefore, the boundaries of the system must be sufficiently broad to encompass all possible system repercussions. It is particularly important for the description to include the relationship between the system being assessed and the larger system to which it belongs.

Diagram illustrating the safety assessment process



3.2.4 The safety repercussions of a possible loss or degradation of the system will determine, in part, the characteristics of the operational environment in which the new scenario or implemented system will be integrated. Therefore, the description of such environment included all the factors that could have a significant effect on safety. These factors will vary from case to case and could include, for example, the specific characteristics of the air traffic system and other related factors.

3.2.5 The description of the regional system includes the contingency procedures and other non-ordinary operations, such as the various types of deficiencies or failures in communications or navigation aids.

3.2.6 The first step in the verification of the safety assessment process is a description of the system or proposed change. Although this was specified in the previous chapter, it is important to recall its systematic relationship, which permits a logical and methodical analytical process. The “system”, as defined for the safety assessment, will always be a sub-component of a larger global ATM system.

3.3 Hazard identification methodology for ATSRO implementation

3.3.1 Regarding the previous point, the group of experts attending the SAMRA workshop applied the methodology described in Doc 9859 (SMM) for the identification of hazards in a logical and sequential manner, and a more objective and systemic management or risks, in order to determine the technical feasibility of ATSRO in the SAM Region. **Appendix 2 to Chapter 3** contains the hazard identification and risk management form used for this purpose.

3.3.2 It should be noted that the hazard identification process was carried out in a multi-disciplinary and integrated manner in the Region. This analysis was conducted at the SAMRA/1 workshop. An attempt was made to identify all potential hazards through a series of sessions in which a structured approach was applied. The techniques used in the workshop followed a structured, multi-disciplinary approach that included the following aspects:

a) Checklists. Review the experience and data available on accidents, incidents or similar systems, and prepare a hazard checklist. Aspects that present a possibility of risk will require a more in-depth assessment.

b) During the sessions, the team was able to review the hazard checklists, generate ideas on hazards in a more broad and free manner, and analyse potential scenarios in detail. These sessions require individuals with diverse operational and technical experience, and generally follow a guided discussion format. At this SAMRA/1 workshop, a facilitator with knowledge of teamwork techniques was designated for the group sessions.

c) Representatives accredited by each State of the Region, with knowledge of the relevant areas of the ATSRO project, participated in the workshop. The range of knowledge was broad to make sure that all the aspects of the ATSRO route system were addressed. However, it should also be noted that each team shared its operational experience, which facilitated a qualitative analysis.

d) During this stage, work was done in plenary sessions, with the participation of all the participants of the workshop, who agreed to, and validated, each of the hazards and the associated consequences. This was recorded in a document for the "safety library" of the Region.

3.3.3 For the identification of hazards, all possible alternatives were analysed, from the least likely to the most likely scenario, duly considering the "worst" conditions or context. It is also important to note that the hazards identified by this team of experts had to be "credible" and consistent with the operational context and experience of all the participants.

3.3.4 An important point to note is that sometimes it is difficult to establish the difference between the worst-case scenario and one based on coincidence or assumptions, which should not be taken into account. To overcome this problem, the following criteria were applied:

a) Worst-case scenario: The most unfavourable conditions are foreseen; for example, extremely high traffic levels, disturbance due to extreme weather conditions.

b) Most likely or credible scenario: This assumes not exaggerating nor expecting a combination of extreme conditions during the operational life cycle of the system.

c) This type of assessment should always analyse the most critical phase of flight in which the aircraft could be affected by failure of a system considered to be critical, although in general it was not necessary to assume that all failures would occur at the same time. However, the group identified all common or recurrent failures occurring when a single (trigger) event initiates a multiple cause and makes the system collapse.

3.3.5 Upon concluding its discussions, the SAMRA/1 workshop recorded the hazards, describing each of them, as agreed upon and validated by the group of experts. Likewise, it recorded their associated consequences, together with the assessment of their likelihood and severity. This activity permitted an objective risk management and the definition of the necessary mitigation measures, which will be later described. This list was updated whenever new hazards were identified and new scenarios emerged, which

called for an analysis of the required mitigation measures. All the background information gathered during the SAMRA workshop was recorded in the table that summarises the different plenary sessions, shown in **Appendix 1 to Chapter 4**, in relation to the hazards and risks identified during the workshop.

3.4 Analysis of the consequences of hazards in ATSRO implementation

3.4.1 Based on the hazards agreed upon and recorded and the associated consequences identified for each of them, the task of determining the severity of each of these consequences began. Once this information was approved, the workshop proceeded to the next stage, applying risk management in terms of the likelihood and severity of the events described, with a view to the classification of risks according to the Management Triangle, which will be described in detail in Chapter 4.

3.4.2 Although the assessment of the severity of the consequences will always imply some subjective judgment, well-structured and guided group discussions based on a standard risk classification (Doc 9859), with qualified participants with broad experience in their respective specialties should guarantee an objective and professional result. Once the severity of all the hazards identified was assessed, the results were recorded in the table of hazards, including the justification of the analysis, which appears in Appendix 1 to Chapter 4, referred to the identification of hazards and operational risks during the workshop. The Appendix contains the table summarising the hazards identified and their associated consequences, leading to the next stage, described in Chapter 4, involving the ATSRO safety assessment.

3.5 Identification of hazards in ATSRO implementation

3.5.1 During the hazard identification stage, all possible sources of system failure were analysed. Depending on the nature and size of the system analysed, the sources were as follows:

a) Equipment (software and hardware);
b) Operational environment (*e.g.*, physical conditions, airspace, route design);
c) Human operators;
d) Human-machine interface;
e) Operational procedures;
f) Maintenance procedures;
g) External services; and
h) Others

3.5.2 The experts participating at the 2010 SAMRA workshop followed this hazard identification process, applying the techniques defined in the theory of PhD. James Reason (Doc 9859) to determine the importance of latent or underlying conditions in the system, since latent conditions are not easily manifest and are only evident when an undesired event (accident) occurs. That is why this process seeks to answer questions such as: "how could the personnel misinterpret this procedure?" or "how could a qualified person misuse this new function or this new system (intentionally or not) within the scope of ATSRO?"

3.5.3 The validation and registration of the hazards identified were defined in plenary session and will be described more specifically later. The respective consequences were also assigned in order to proceed to the next stage, involving the assessment of the likelihood and severity and the subsequent adoption of the required mitigation measures. This registration process is a fundamental part of this document, since it summarises the actions assessed. It is also part of the safety assessment concept identified as the "*technical safety library*", for future verification of the assumptions used in operational risk management, as specified in Doc 9858, SMM. This registry must be updated as new hazards are identified and new proposals are submitted in the Region, serving as a baseline for subsequent analyses. Figure 2 shows the safety information

flow and the safety library structure, as a validated registry for an efficient management of safety assessment methods.

Figure 2. Safety Library - Doc 9859, SMS

3.6 Description of the hazards analysed by the group of experts of SAMRA/1

3.6.1 Based on the hazards identified by the group of experts of the SAMRA/1 workshop, different *focus groups* activities were carried out to analyse and identify specific hazards that might affect route network optimisation, and to define the context of these hazards, whether echnical, natural or economic. Likewise, the specific hazards were assigned to the different analytical scenarios. Subsequently, the consequences of each hazard were identified, and the results recorded in the table of hazards shown in Appendix 2 to Chapter 3.

3.6.2 In order to identify the hazards related to ATSRO implementation and facilitate the analysis, the hazards previously identified were classified according to the most frequent consequences, defined as recurrent events (number of repetitions). These were defined as: Airprox and Failures, due to the ATC or mechanical reasons, as listed below:

a) Consequences related to **Airprox** hazards, of which a total of eight (8) similar events of this common component were identified, distributed as follows**:**
   - i) Inability of the aircraft to maintain the RNAV route
   - ii) Lack of coverage of ground and air navigation aids
   - iii) Degradation of systems, such as GNSS, surveillance and communications
   - iv) Incursion in restricted airspaces and RNAV routes
   - v) Civil/military coordination deficiencies
   - vi) Outdated aircraft database
   - vii) Deviations due to equipment failure or contingencies
   - viii) Increase in ATCO workload

b) Consequences associated to a hazard resulting from an **operator or mechanical (engine) failure**, of which two (2) common events were identified, as follows:

i) Deviations or route cancellations resulting from adverse meteorological conditions and/or engine failure resulting form volcanic ash.
ii) Airspace sectorisation inadequate for ATSRO purposes

3.6.3 As to hazards of a specific type with a common criterion, the following were identified:

a) By type of consequence related to the hazard due to **AIRPROX:**

i) Operation with an outdated aircraft database in the ATSRO route network of the SAM Region.
ii) Deviation due to equipment failure
iii) Deviation due to contingencies
iv) Inability of the aircraft to maintain the RNAV route
v) Degradation of systems defined as:
– GNSS satellite navigation
– Surveillance
– Communications, such as CPDLC, VHF and HF
– Incursion in restricted airspace and RNAV routes

b) By type of consequence related to the hazard due to **Failure:**

i) Increased ATCO workload
ii) Volcanic ash

3.6.4 As to the classification according to the nature of the hazard, two types were identified: **technical** hazards, which are those related to the operation of the system, and **natural** hazards, defined as meteorological phenomena or others, as follows:

a) **Technical type**

i) Inability of the aircraft to maintain the RNAV route
ii) Lack of coverage of ground and air navigation aids
iii) Degradation of systems such as GNSS, surveillance and communications
iv) Incursion in restricted airspaces and RNAV routes
v) Civil/military coordination deficiencies
vi) Outdated aircraft databases
vii) Deviations resulting from equipment failure or contingencies
viii) Increased ATCO workload

b) **Natural type**

i) Adverse meteorological conditions (storms, hurricanes, turbulence, tornados)
ii) Volcanic eruptions

3.6.5 With respect to the definition of the consequences associated to the hazards, the group of experts of the SAMRA/1 workshop identified the following possible scenarios:

a) Hazards derived from aircraft operations on ATS routes were divided into two large groups. The common denominator for **technical** hazards was the ***operation of aircraft not certified*** to operate on ATSRO routes. Another relevant aspect that was analysed was the ***degradation of the capability to operate in the ATSRO route network***. The consequence of both hazards is:

i) AIRPROX

b) In the case of **natural** hazards and their associated consequences, resulting from volcanic ash caused by unexpected eruptions and phenomena caused by solar storms that might affect global navigation systems, the following possible *sequelae* or results were identified:

i) Degradation of GNSS, surveillance and communication systems

3.7 Conclusions of the identification of hazards and the analysis of consequences for ATSRO

3.7.1 Based on the identification of the specific hazards described and their consequences, two constant factors are noted: the inability of aircraft to maintain RNAV, which generates **Airprox** events; and **failures** caused by both **ATC personnel**, which generate an **increased workload** in the system, and by **operator errors**. It is also important to highlight the effects of **nature**, which degrade the systems.

3.7.2 Once hazards have been defined, the risk management process may be started, as described in the next chapter.

Chapter 4: Operational risk management process for the implementation of the route network - ATSRO

4.1 Introduction

4.1.1 In this stage of the process, the background information defined in the previous chapter and by the group of experts of the SAMRA/1 workshop are analysed and compared. After validating this information, the methodology for determining operational risk levels described in the 7-step process is applied as required in the SMM. This stage of the analysis will depend on two variables defined as: the ***likelihood*** of occurrence of an event, and the worst-case scenario, known as the ***severity*** of an event. A qualitative analysis is conducted and, finally, operational risk matrices are used, determining what additional actions can be agreed by the group of experts and applied in order to minimise or effectively contain the operational risks in the ATS route network optimisation.

4.1.2 For purposes of standardising the concepts used, risk will be defined as the assessment of the consequences of a hazard (analysed in Chapter 3), expressed in terms of ***likelihood*** and ***severity***. Accordingly, once the hazards and their associated consequences have been defined, based on a given value determined by the likelihood of occurrence of an event and its severity, the matrices defined in the SMM will be used, according to the following formula:

Hazard – Consequences = f [P* S]
where:
P= likelihood

S= severity of an event

4.1.3 Accordingly, in this type of analysis, the following steps of the risk assessment process will be completed:

3rd step: Risk assessment, expressed in terms of **likelihood**

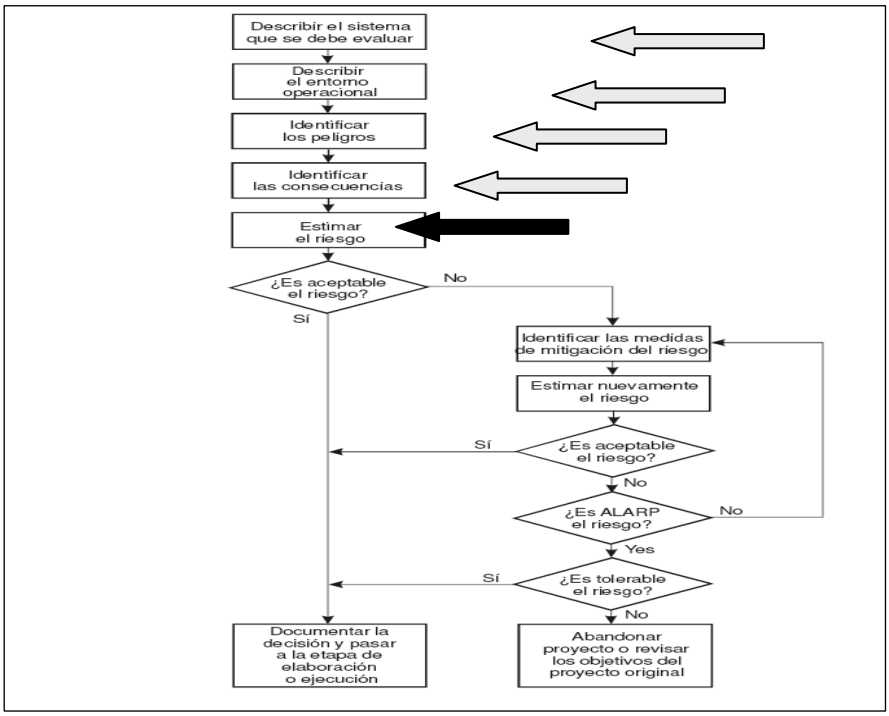
4th step: Risk assessment, expressed in terms of **severity**

5th step: Risk index/tolerability for ATSRO

6th step: Risk mitigation for ATSRO

4.1.4 In order to estimate the ***likelihood*** of occurrence of an event, an approach similar to the one adopted in the second step is applied. The likelihood will be specified by qualitative category, but certain numeric values will also be assigned, based on the reference matrices, to determine the likelihood related to each condition. Some of the events analysed in this study contained data that was used for direct numerical estimates of the likelihood of failure. For example, data available on component failure rates for several years with respect to system hardware components was relevant for SAM ATS route network flows.

4.1.5 The estimate of the likelihood of occurrence of hazardous events related to human errors will generally involve a degree of subjectiveness, and it should be borne in mind that, even when assessing hardware, there is always the possibility of failure due to human error like, for example, incorrect equipment maintenance procedures. However, as in the previous case, a better definition and assessment of severity is achieved through structured group discussions, with participants with ample experience in their respective specialties. Likewise, a standard risk classification and standard matrices should ensure a more objective, realistic, consensual result.



The graph above shows the analytical stage of Chapter 4

4.2 Aspects taken into account for determining the likelihood of occurrence in ATSRO implementation

4.2.1 For this stage of the study, the matrix contained in the SMM and defined by ICAO as a global risk management analytical tool will be used, as shown below:

Matrix for determining the likelihood of an event

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	5
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	4
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	3
Improbable	Muy improbable que ocurra (no se sabe que haya ocurrido)	2
Extremadamente Improbable	Casi inconcebible que el suceso ocurra	1

4.2.2 Another aspect that must be included in this discussion is the origin of the various values defined for this quantitative analysis. This matrix is based on operational experience worldwide and on the likelihood defined for each occurrence as follows:

- Frequent: 1 to 10^{-3} per hour of flight
- Occasional: 10^{-3} to 10^{-5} per hour of flight
- Remote: 10^{-5} to 10^{-7} per hour of flight
- Unlikely: 10^{-7} to 10^{-9} per hour of flight
- Extremely unlikely: + 10^{-9} per hour of flight

4.2.3 The analysis of the hazards identified in the previous chapter showed, with respect to the associated consequences, a similar indicator with a value of **"Occasional**" or **4**. This group of elements was assigned the highest likelihood according to their consequences, as analysed and identified according to the following distribution:

- **Three (3) due to Airprox** (technical type)
- **One (1) due to engine failure** (natural type)

Occasional, equivalent to a value of "4"

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	5
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	4
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	3

4.2.4 All the components of the specific hazards identified were the result of an **outdated database**, deviations due to **equipment failure**, deviations due to **contingencies** and/or the effect of **volcanic ash** or adverse meteorological conditions. This group of hazards had a likelihood of occurrence of **4 (four),** which, according to the likelihood matrix, translates into effects that occur some times or that have occurred infrequently in the SAM Region.

4.2.5 Regarding the previous analysis and based on the defences existing in this scenario at the time of conducting this analysis, the following defences existed for this scenario: use of the WGS-84 geo-reference system, ATS surveillance services, AIS systems, use of collision avoidance systems (ACAS/TCAS), application of continuous oversight principles, panel meetings (GREPECAS 12/7), safety assessments, previous instructions in the MET/ PIB and ATM areas, application of operations manuals, cancellation of operations on routes affected by meteorological problems, application of the procedures of Doc 4444, publication of NOTAMs, and use of contingency procedures. All of the aforementioned actions seek to contain or minimise the likelihood of risks existing at the time of the analysis.

4.2.6 The group of consequences associated to technical (6) and nautral (1) hazards resulted in a likelihood lower than the one previously described, and was assigned an indicator of **3 (three)**, which, according to the matrix, means a **"remote**" likelihood, which is equivalent to **unlikely**. However, it may occur or has rarely occurred in the ATS system. Consequently, the risk assigned to this set of hazards was lower compared to the previous one. The consequences thus identified and analysed showed the following distribution:

- **Six (6) due to Airprox** (technical type)
- **One (1) due to engine failure** (natural type)

Remote, equivalent to a value of "3"

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	5
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	4
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	3

4.2.7 With the **application of the defences existing** in this system, the likelihood was determined by comparing the existing protections in the system, *i.e.*, failure reversal procedures, navigation charts, oversight systems, publication of the AIP, airborne collision avoidance systems (ACAS), autonomous navigation systems (INS/IRS), satellite navigation systems (GNSS), specific contingencies for each natural event (volcanic ash and turbulence), as well as the air crew notification system or NOTAMs. Publication of national documentation based on documents such as Doc. 9613, Doc. 4444 and Annexes 2 and 11.

4.2.8 With respect to the analysis of the hazard resulting from **civil-military coordination failures** between control centres, the panel defined the **incursion in restricted airspaces** in RNAV routes as a specific hazard within the scope of ATSRO, with the consequence of a potential loss of separation or **Airprox**. Based on this, the hazard due to **coordination failures** was considered as **"Remote"**, which, according to the

likelihood matrix, corresponds to a value of **"3"**, that is unlikely to occur, but may occur or has rarely occurred in the ATS system.

Remote, equivalent to a value of "3"

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	**5**
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	**4**
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	**3**

4.2.9 The analysis of the existing defences in the system showed that it had the appropriate regulations, publication of restricted areas, NOTAMs, AIP, ATC services, ATS surveillance, collision avoidance systems (ACAS), coordination between control centres and the respective FIRs, and letters of operational agreement (LOAs). Consequently, the likelihood of occurrence of an event was considered as **"remote"**. However, the panel highlighted that this item was a latent condition for all control areas in the SAM Region.

4.3 Aspects taken into account for determining the severity in ATSRO implementation

4.3.1 It should be noted that this severity analysis completes the fourth step in the operational risk assessment process, based on which the likelihood of an event and its relationship with the severity can be determined. This is the essence of operational risk maangement.

4.3.2 It is important to point out that, once the severity of an event is determined in general terms, it is difficult to change its value. For example, in the case of a severity classified as "**A"** (catastrophic), even if multiple defences are implemented to reduce the severity to a level **"B"** (hazardous), it is very difficult that it will occur. Thus, reality and operational experience show that it is easier to modify the likelihood of an event, since a series of actions will be required that will normally depend on the availability of resources. In this stage, all hazards and consequences identified in the preceding chapters are analysed to determine the worst-case scenario, and based on that, identify the defences to foster a more robust scenario that is tolerant to operational errors.

4.3.3 In order to determine this important function in operational risk management, the matrix defined in the SMM and shown below will be used:

Severity Matrix

Severity of the event	Meaning	Value
Catastrophic	Destruction of equipment Multiple deaths	**A**
Hazardous	Significant reduction of safety margins, physical damage or workload that prevents operators from performing their tasks in a precise and complete manner Serious injury Major damage to equipment	**B**
Major	Significant reduction of safety margins, reduced ability of the operator to respond to adverse operating conditions as a result of an increased workload or conditions that hinder efficiency Serious incident Injury to individuals	**C**
Minor	Interference Operational limitations Use of emergency procedures Minor incidents	**D**
Insignificant	Mild consequences	**E**

4.3.4 Although the assessment of the severity of the consequences of a hazard will always have some degree of subjectiveness, this is offset by discussions in duly qualified and multidisciplinary groups. With the participation of professionals in each area concerned, as was done in the SAMRA/1 workshop, the result will be a consistent and objective professional opinion for the definition the actions required for risk mitigation.

4.3.5 According to the risk assessment process, once the **severity** assessment of all the consequences of the hazards identified has been completed and the results classified, they must be recorded in the hazard and risk table. Regarding this activity, a brief description of the arguments used to define the worst-case scenario is provided, together with the justification of the severity classification by the work teams.

4.3.6 Based on the analysis of the **severity assigned** to each hazard, eleven (11) hazards were identified by the SAMRA/1 workshop, 10 of which are in the **" Major "**, or **"C"** category. According to the severity matrix, this means a significant reduction of safety margins, a reduced capability of the operator, a response to adverse operating conditions resulting from increased workload or conditions that impair efficiency, personal injuries, or the occurrence of a serious incident. Based on this, most of the hazards in ATSRO implementation were assigned a value of **"C"**, as shown in the figure below.

Severity is defined as "Major" or "C"

Gravedad del suceso	Significado	Valor
Catastrófico	— Destrucción de equipo — Muertes múltiples	**A**
Peligroso	— Reducción importante de los márgenes de seguridad, daño físico o una carga de trabajo tal que los operarios no pueden desempeñar sus tareas en forma precisa y completa — Lesiones graves — Daños mayores al equipo	**B**
Mayor	— Reducción significativa de los márgenes de seguridad, reducción en la habilidad del operador en responder a condiciones operacionales adversas como resultado del incremento de la carga de trabajo, o como resultado de condiciones que impiden su eficiencia — Incidente grave — Lesiones a las personas	**C**

4.3.7 The hazard entitled "**Inadequate airspace sectorisation for ATSRO"** was assigned a value **"D**" or **"Minor"**, being the only one assigned this severity classification by the group of experts. This is related to the severity of the event, which, based on operational experience, is considered as an event with minor consequences, causing operational interference and limitations, and calls for emergency or contingency procedures, as applicable. It is important to highlight that, of all the hazards analysed, this was the only one classified as **"Minor**", setting a difference with respect to the rest of the sample analysed.

Severity is defined as "Major" or "D"

Gravedad del suceso	Significado	Valor
Catastrófico	— Destrucción de equipo — Muertes múltiples	**A**
Peligroso	— Reducción importante de los márgenes de seguridad, daño físico o una carga de trabajo tal que los operarios no pueden desempeñar sus tareas en forma precisa y completa — Lesiones graves — Daños mayores al equipo	**B**
Mayor	— Reducción significativa de los márgenes de seguridad, reducción en la habilidad del operador en responder a condiciones operacionales adversas como resultado del incremento de la carga de trabajo, o como resultado de condiciones que impiden su eficiencia — Incidente grave — Lesiones a las personas	**C**
Menor	— Interferencia — Limitaciones operacionales — Uso de procedimientos de emergencia — Incidentes menores	**D**

4.3.8 For the consequences associated to hazards classified as **Airprox**, this category had the largest number of events, with a total of nine (9), all of which were classified as "**C"** or "**Major"**. In the operational setting, this means a significant reduction in safety margins, a reduced capability of the operator, and a response to adverse operating conditions as a result of increased workload or conditions that impair efficiency, personal injuries, or the occurrence of a serious incident.

Severity is defined as "Major" or "C"

Gravedad del suceso	Significado	Valor
Catastrófico	— Destrucción de equipo — Muertes múltiples	**A**
Peligroso	— Reducción importante de los márgenes de seguridad, daño físico o una carga de trabajo tal que los operarios no pueden desempeñar sus tareas en forma precisa y completa — Lesiones graves — Daños mayores al equipo	**B**
Mayor	— Reducción significativa de los márgenes de seguridad, reducción en la habilidad del operador en responder a condiciones operacionales adversas como resultado del incremento de la carga de trabajo, o como resultado de condiciones que impiden su eficiencia — Incidente grave — Lesiones a las personas	**C**

4.3.9 For hazards resulting from **operator** or **mechanical failures**, this sample analysed three (3), which, like in the previous case, were classified as **"Major"**.

4.3.10 According to operational experience, the lack of **civil-military coordination** had caused the incursion of unauthorised aircraft in the route network of the Region. This activity causes **Airprox** events, and was considered a relevant aspect that needed an in-depth analysis at a regional level in order to establish clear criteria for reducing the impact of this type of failures.

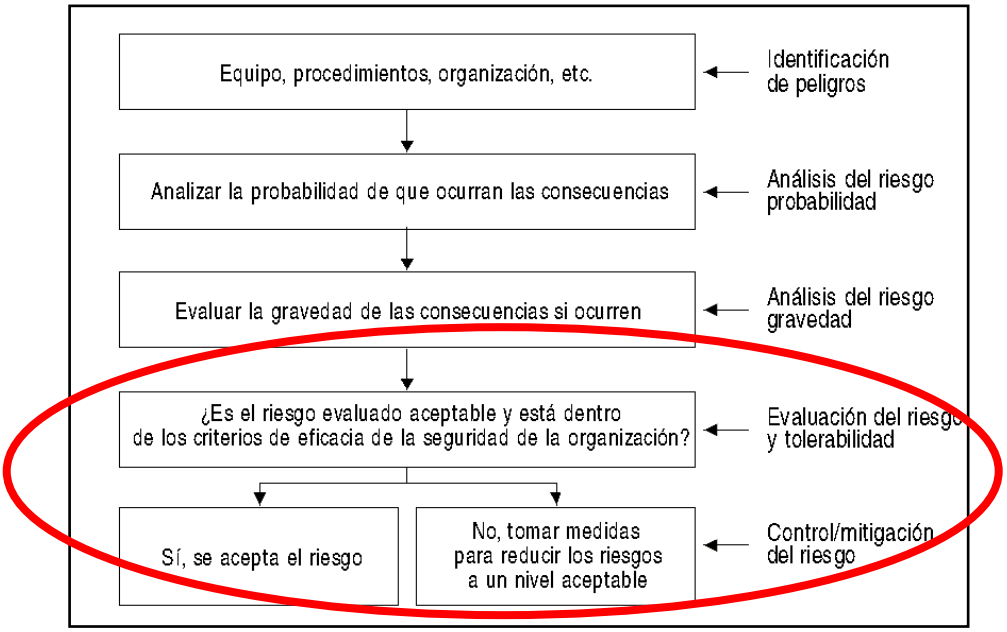
4.3.11 Another important topic that was analysed was the operation with unmanned aircraft of the UAV type. Two States expressed their concern about the increase in the number of operations of this type, which are conducted without the proper coordination with the control centres involved in the Region. The experts also identified as a potential hazard the capacity of these devices to fly and operate above level 290. Therefore, this new scenario can be classified as a potential hazard for ATSRO implementation and can cause serious injuries and major damage to the equipment. Based on the severity matrix, it was assigned a value of **"C"** or **"Major".** Finally, UAV operations are increasingly a more likely scenario in the SAM Region, thus tangentially affecting ATSRO implementation. Therefore, they must be considered in the planning.

Chapter 5 Operational risk assessment and mitigation for ATSRO

5.1 Introduction

5.1.1 As noted in the previous chapters, the potential hazards have been identified and associated to their respective consequences. In this stage of the process, operational risk levels will be determined, defining their acceptability, based on a comparison of the various criteria specified in the matrices, in order to measure the level of risk and assign their respective tolerability index based on the defences applied. In sum, the general concept of this document has been to reduce the operational risk to an acceptable level (ALoS), keeping it realistic and consistent with our potential development. This phase of the study is shown in the figure below.

Analytical Phase of Chapter 5



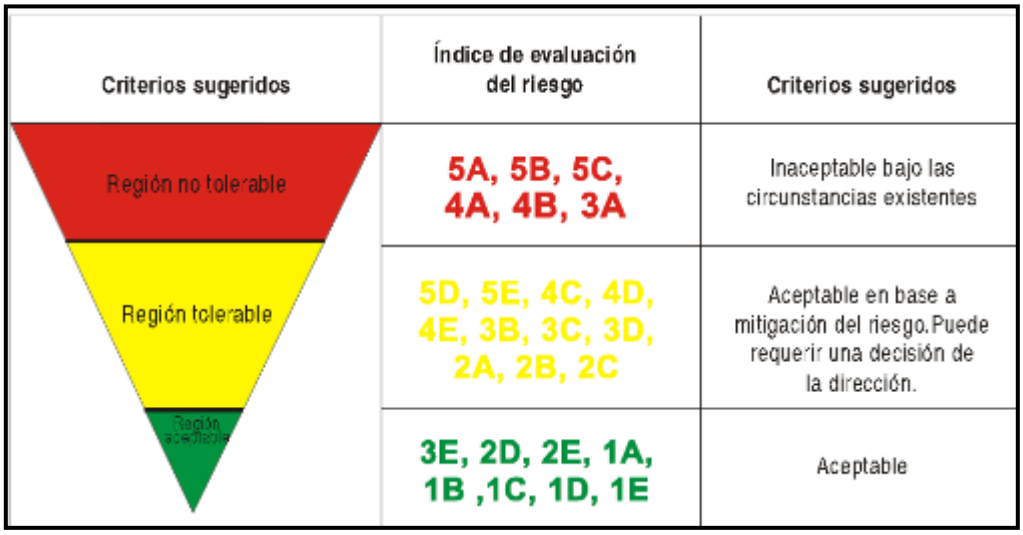
5.2 Operational risk mitigation criteria

5.2.1 The acceptability of a risk will depend on the defences analysed in the proposed scenario. In the case of the ATS route network optimisation, the defences existing in the SAM Region were identified and then the acceptability criteria were applied from a two-dimensional perspective. Acceptability is generally based on the severity matrix of an event and the likelihood of its occurrence. This analysis was based on the SMM manual, using as a reference CAP 670, ATS service requirements, the United Kingdom CAA requirements, adjusted to the operational reality of the SAM Region with respect to risk classification.

5.2.2 In relation to the tolerable risk concept, there is an area between the acceptable risk and the unacceptable risk in which the decision as to the acceptability is not clear or determinant. These latter risks belong to a category in which risk may be tolerable if reduced to a level as low as reasonably practicable (ALARP). When a risk is classified as ALARP, an attempt should always be made to implement mitigation measures (defined as additional defences) that are deemed feasible for the SAM Region. In the case of risks that fall in the intermediate area of the management triangle (shown in the figure below), they are defined as

acceptable, based on risk mitigation. These risk levels may require a decision by management. Risks in this category are not classified rashly as tolerable. Each case must be examined individually, as stated in the previous chapters, taking into account the benefits and costs derived from the implementation of the proposed changes.

Table of Operational Risk Mitigation Criteria



5.2.3 The identification of the appropriate risk mitigation measures requires a good understanding of the hazards identified in Chapters 3 and 4 in relation to the factors that contribute to the occurrence of an event of these characteristics, since any effective mechanism for reducing the risk will have to modify one or more of these factors in order to achieve a reduction to an acceptable level or ALoS.

5.2.4 In this particular case of safety assessment, the following possible measures to mitigate the operational risks and apply a mature ALoS have been studied:

a) Revision of the system design;
b) Modification of operational procedures;
c) Organisational changes;
d) Training of personnel in the SAM Region; and
e) Use of information and communication technologies.

5.3 Description of operational risk management for ATSRO in the SAM Region

5.3.1 Based on the analyses conducted in the previous chapters and the background information and conclusions of the SAMRA/1 workshop, in this stage of the process, operational risk management will be applied and the proposed scenario for the Region will be analysed.

5.3.2 In order to facilitate the analysis, three different groups have been established, based on the likelihood of occurrence ordered from “major” (4) to “minor” (2), explaining the defences required to manage risks at an acceptable level. The summary of the indices identified for a hazard and the respective mitigating measures based on additional actions is shown below:

a) **For technical failures**

Hazards classified as technical failures have been defined as:

- Outdated databases
- ACC-to-ACC coordination failures
- Equipment failures and contingencies
- Inability of aircraft to maintain the RNAV route
- Lack of coverage of ground and air navigation aids
- Degradation of systems such as GNSS, surveillance and communications
- Incursion in restricted airspaces and RNAV routes
- Deficiencies in civil-military coordination
- Outdated aircraft databases

- The consequences associated to these hazards were:
  - Airprox
  - Operator and mechanical failures

- The risk management criterion was:
  - **4**, equivalent to an **"occasional"** likelihood
  - **C**, equivalent to a **"major"** severity

- The combination of hazard **likelihood** and **severity** is equivalent to:

- **4 C**, which means acceptable, based on risk mitigation; may require a decision by management.

b) **For the operation of aircraft in ATSRO**

Natural hazards have been defined as:

- Volcanic ash
- Meteorological effects

- The consequences associated to these hazards were:

  - Airprox
  - Operator or mechanical failure

- The risk management criterion was:
  - **4**, equivalent to an **"occasional"** likelihood
  - **C**, equivalent to a **"major"** severity

- The combination of hazard **likelihood** and **severity** is equivalent to:

o **4 C,** which means acceptable, based on risk mitigation; may require a decision by management.

c) **Regarding civil-military coordination**

Hazards due to lack of coordination have been defined as:

o Inadequate airspace sectorisation for ATSRO

- The consequence associated to these hazards was:

o Increased ATCO workload

- The risk management criterion was:
  - o **3**, equivalent to a **"Remote"** likelihood
  - o **C**, equivalent to a **"Major"** severity

- The combination of hazard **likelihood** and **severity** is equivalent to:

o **3 C**, which means acceptable, based on risk mitigation; may require a decision by management

Safety Risk Assessment Matrix

Probabilidad del riesgo	Gravedad del riesgo				
	Catastrófico A	Peligroso B	Mayor C	Menor D	Insignificante E
Frecuente 5	5A	5B	5C	5D	5E
Ocasional 4	4A	4B	4C	4D	4E
Remoto 3	3A	3B	3C	3D	3E
Improbable 2	2A	2B	2C	2D	2E
Extremada-mente improbable 1	1A	1B	1C	1D	1E

5.3.3 Based on the identification and detailed description of hazards, and on the assignment of operational risks defined in the previous paragraphs, it is possible to assess and determine the feasibility of ATSRO implementation in the SAM Region. Furthermore, based on the risk matrix indices shown above, it

is possible to create an overall risk map and study the various alternatives (additional defences) to minimise or mitigate risks in ATSRO.

5.3.4 Based on the above, it may be stated that the resulting average level is "**Occasional"**, which is equivalent to **"4"**, with an average value of 4C for the combination defined as the worst-case scenario. Therefore, the operation in an optimised ATS route network is acceptable, based on risk mitigation, and it will eventually require a decision by management. Based on the application of defences to reduce the risk and the resulting index, the operational risk level achieved through the application of the various mitigation measures can be reduced to a value of **2 C,** which means **acceptable based on risk mitigation**, and which might require a decision by management.

5.3.5 The additional actions required within the operational context of the SAM Region will be explained below. These include technological measures, regulatory action or changes, training and continuous supervision of personnel. To this end, the following actions for the efficient implementation of ATSRO in the SAM Region are proposed.

5.3.6 The strategies aimed at mitigating the operational risks of **technical hazards**, such as the degradation of navigation capability, are as follows:

a) **Technical hazards**, with their ***Airprox*** *consequence*:

- Outdated databases
- Failures in ACC-to-ACC coordination
- Equipment failure and contingencies
- Inability of the aircraft to maintain the RNAV route
- Lack of coverage of ground and air navigation aids
- Degradation of systems such as GNSS, surveillance and communications
- Incursion in restricted airspaces and RNAV routes
- Deficiencies in civil-military coordination
- Effect of deviations due to solar storms
- Outdated aircraft databases
-

Additional defences

- In the **technological** field

  - Accessibility and availability of the SAM data bank
  - Data exchange through the Internet
  - Data link
  - Implementation of ICT solutions
  - Anonymous on-line reporting system
  - Real-time monitoring
  - RAIM monitoring and alerts
  - Implementation of the digital voice data recording and monitoring programme

- In the **regulatory** field

  - Publication of ATSRO manuals and procedures
  - Establish effective FPL control procedures
  - Operational approval of non-approved aircraft to operate in ATSRO
  - Contingency procedures

- Implement and certify ISO: 9001:2008 QMS quality management programmes in MET/AIS
- Use of lateral deviation forms
- Define the alternate routes by area of operation
- Publish in the AIPs the areas with no navaid coverage

o In the **training** field

- Updating of training programmes
- Continuous SMS training for service providers
- Training of service providers in the role of SSP
- Holding of NOSS seminars/workshops

o In the **supervision** (continuous oversight) field
- Define the control of the FPL oversight programme
- Establish compliance of USOAP non-conformities

5.3.7 Consequently, risk management indices vary from an initial risk level of **4C to a level of 2C** and the likelihood of occurrence drops.

o **Entities responsible for this action**: SAM States
ANSPs
CARSAMMA

5.3.8 Strategies to mitigate the operational risks related to natural hazards:

a) **Meteorological effects and volcanic eruptions on ATSRO routes, with the consequences of Airprox and system degradation:**

Additional defences

o In the **technological** field

- Satellite observation
- Determine ATC sector/ATFM capacity
- Satellite observation alerts
- Information *via* data link

o In the **regulatory** field

- Publication of ASHTAMs
- Determine ATC sector/ATFM capacity
- Air traffic re-planning procedures
- Certify the ISO: 9001:2008 QMS quality management programmes in MET/AIS

o Int he **training** field
- Training for continuous implementation of contingency procedures
- Determine ATC sector/ATFM capacity
- Air traffic re-planning procedures

- SMS training

- In the **supervision** (continuous oversight) field
  - Implement oversight services
  - Implement SSP
  - Verify the publication of alert NOTAMs

- Risk management varies from an initial risk level of 3 C to a risk level of 2C; the severity drops as a result of the additional actions.

- **Responsible entities**: ACCs of the SAM States, operators, ANSPs

5.3.9 Strategies for mitigating the operational risks due to hazards related to civil-military coordination:

a) Civil-military coordination failures that affect ATSRO, resulting in Airprox:

Additional defences

- In the **technological** field

  - Updating of chart displays
  - NOTAM data bank
  - Integration of data link technologies
  - Implementation of the regional data bank
  - Use of fast simulation
  - Implementaion of level “D” simulation
  - Determine ATC sector capacity

- In the **regulatory** field

  - Updated and applicable publications
  - Publication of committees
  - ACC-to-ACC coordination regulations
  - Civil-military memorandum of agreement
  - Civil-military coordination (LOAs)
  - Specific contingency procedures for this phenomenon
  - Contingency procedures
  - Air traffic re-planning procedures
  - Publication of alert NOTAMs

- In the **training** field
  - Training of ATCOs, pilots and civil-military managers
  - Seminar/workshop on civil-military coordination of Airprox
  - Training of high-level officials in the SMS concept

- In the **supervision** field
  - Verify the LOAs
  - Implement the continuous monitoring committees (CRM)

- Compliance with the SSP

- Risk management varies from an initial risk level of **3 C to a risk level of 2C,** and only the likelihood drops

- **Responsible entities**: Aeronautical authorities, ACCs and air navigation service providers (ANSPs) of the SAM Region.

Chapter 6 Conclusions of operational risk assessment and mitigation for ATSRO

6.1 Introduction

6.1.1 This chapter summarises the background information gathered during the risk assessment, with the purpose of defining the average risk level for ATSRO. It also analyses the arguments required to determine the acceptable level of operational risk (ALoS) for the optimisation of the ATS route network in the SAM Region. Finally, it contains recommendations derived from this study to support the ATS route network optimisation programme approved for the SAM Region.

6.1.2 Chapter 2 of this document analysed the qualitative methodology for assessing risk management with respect to ATSRO, based on the description of the system, in keeping with the guidelines of the corresponding optimisation programme.

6.1.3 Chapter 3 summarised the hazard identification process for ATSRO and explained the methodology used. It also mentioned the regional workshop (SAMRA/1) that was held with the participation of a multidisciplinary group of experts. The workshop identified the hazards and assessed the consequences in order to determine the resulting operational risk level.

6.1.4 Chapter 4 covered aspects related to operational risk management, analysing the background information defined by the SAMRA/1 workshop, the identification of hazards and their consequences. This information was validated by the workshop, and the methodology for determining the level of the operational risks described in the seven-step process was applied, following the data processing required in the SMM manual. In this analytical stage, the two variables defined--likelihood and severity of an event--are analysed, always making reference to a qualitative analysis. Finally, risk matrices are applied in order to determine what applicable additional action could be agreed by the expert workshop to minimise and efficiently contain the operational risks in ATSRO.

6.1.5 In Chapter 5, a risk acceptability analysis was conducted, based on the defences analysed in the proposed scenario, identifying the defences associated to ATSRO that existed in the SAM Region. Subsequently, criteria were applied to judge the acceptability from a two-dimentional perspective.

6.2 Final summary of the risk case study within the scope of the ATS route network optimisation

6.2.1 Based on the analysis of the safety case study and the action taken and the proposed additional defences, the average operational risk level has a likelihood of occurrence of **2,** which defines it as **Acceptable** with a severity **C** or **Major**, which means a significant reduction in safety margins, a reduced ability of the operator to comply with the safety margins, which translates into a global risk level of **2 C**. The conclusion is that it is within an acceptable range, according to the management triangle described in Chapter 5 item 5.2.2 and, in some cases, would potentially require a decision by management and monitoring of the operation in the SAM Region.

6.2.2 In summary, based on the analysis made, it may be concluded that, with the current action taken, the implementation of the ATSRO route network does not face any problems and will not generate additional hazards in the current airspace structure. The implementation of the additional measures identified in this document and listed in the following chapter will optimise the safety of operations in the new

operational environment, thus contributing to the achievement of the strategic objectives of the global ATM plan. In sum, safety in the Region is at an acceptable level of operational risk, averaging **2 C**, which falls within the concept of controlled risk.

Chapter 7 Recommendations resulting from the operational risk assessment for ATSRO

7.1 Introduction

7.1.1 This chapter lists the recommendations derived from the qualitative study conducted in order to determine the operational risk levels for the ATS route network optimisation in the SAM Region.

7.2 Recommendations of the safety assessment for ATSRO

7.2.1 Based on that described and analysed in this safety study, it may be stated that the commitment of the States of the Region has been a fundamental factor in the achievement of the safety level. However, it should be noted that, as a result of the detailed analysis of the regional system, there are opportunities for improving and preserving the level achieved. Consequently, the States must strengthen and take actions to comply with the optimisation programme in the Region.

7.2.2 **The States** of the Region will provide support in the technological field, through the incorporation of information and communication technologies (ICTs), in keeping with the need to promote the exchange of safety data at the regional level, providing relevant information to define and promote the performance indicators for the Region and record lateral deviations that affect the national and regional ALoS. In the regulatory field, the States will update and publish the changes required for operating on ATSRO routes, and will continue promulgating the different contingency plans and programmes required for the implementation of this system. Regarding training, the States shall encourage knowledge about the application of, and operation on, ATSRO routes, as well as the implementation and monitoring of the SMS phases with respect to the operation of the ATSRO system. The States shall promote continuous training in the requirements operating on ATSRO routes in the short term. Finally, they shall apply the safety oversight and continuous monitoring tools, based on the eight critical elements defined by the SSP.

7.2.3 **The operators** shall promote and carry out the exchange of safety data at regional level to start a performance indicator database for the Region, and will provide the necessary information to determine lateral deviations (hot spots) that affect the ALoS of the Region. Regarding regulations, the operators shall update the contingency plans and programmes required to operate in an optimised ATS route environment. In terms of training, they shall encourage recurrent training for operations on ATSRO route, using navigation system (RAIM) failure simulation and practices in order to identify, on a timely basis, the failures that affect or could affect ATS route capacity. They shall also implement safety management systems (SMS) and, finally, promote continuous training for an efficient operation of the ATS route network, including contingency procedures for each case.

7.2.4 **The ATS/ANSPs** shall exchange safety data at regional level in order to establish the validated indicators for measuring performance in the Region and provide information on the identification and establishment of lateral devications (hot spots) that affect the ALoS of the Region. Regarding regulations, they shall update, within the ACCs, the contingency plans and programmes required for operating in an optimised ATS route environment. For purposes of training, they shall encourage recurrent training for operating on optimised ATS routes, using simulation with standard scenarios and contingency programme practices, with a view to identifying, on a timely basis, the failures that might affect the capacity of the units. As to the SMS concept, those ATSPs that are already in the implementation phase, shall continue with the planned implementation, encouraging the application of proactive processes in the NOSS programme, and finally, promoting continuous training for operating in the ATSRO route environment. The ATSPs that have not done so yet, shall start, as a matter of urgency, the implemenation of SMS. Finally, they shall incorporate

and promote supervision based on the eight critical indicators of continuous oversight, based on the requirements proposed for the interaction between the SMS and the SSP of the States.

7.2.5 **The ICAO South American Regional Office** will include in its planning the holding of the SAMRA/2 workshop, with a view to assessing ATSRO following the optimisation, improving the competencies of experts, and bridging any gaps that may arise. The Regional Office should designate focal points and request the participating States to permit their periodic participation. This type of training will enhance the level of knowledge and will provide positive synergies to preserve the safety levels in the SAM Region.

7.2.6 Finally, the observations and conclusions of this safety case study for ATSRO should be part of the safety library of the Region, creating a baseline that will permit the recording of any proposed improvements in the future concerning risk management and the safety level achieved in the SAM Region.

APPENDIX 1 TO CHAPTER 2

AIR TRAFFIC MOVEMENT BETWEEN FL 290 AND FL 410

Air Traffic Movement in ATS Routes

Air traffic movement between FL 290 and FL 410, by FIR, and percentage of flights in the main ATS routes Period: 13 to 28 January 2008				
Country	**FIR**	**Amount of air traffic in the sample**	**Percentage of flights in the main ATS routes**	**Number of ATS routes**
Argentina	Córdoba	1769	92%	13
	Comodoro Rivadavia	713	96%	9
Bolivia	La Paz	684	97%	13
Brazil	Amazónica	4085	67%	13
	Brasilia	11333	50%	12
	Curitiba	10499	44%	13
	Recife	3418	66%	13
	Sao Paulo (TMA)*	1911	100%	4
Chile	Antofagasta	1480	89%	10
	Easter Island	164	100%	4
	Puerto Montt	412	94%	6
	Punta Arenas**	281	98%	7
	Santiago	2109	89%	13
Guyana	Georgetown	187	97%	9
Panama	Panama	1389	70%	14
Paraguay	Asunción	605	90%	14
Peru	Lima	3599	69%	14
Suriname	Paramaribo	369	98%	11
Uruguay	Montevideo***	892	100%	12

* Provides ACC services in the segment between Río de Janeiro and Sao Paulo. There is a significant volume that does not appear in the sample because it flies below FL 290.

** 91% in ATS route UT 100.

*** There is a significant volume that does not appear in the sample because it flies below FL 290.

Table 2 – Air traffic movement between FL 290 and FL 410, by FIR, and percentage in the main city pairs

Air traffic movement between FL 290 and FL 410, by FIR, and percentage in the main city pairs Period: 13 to 28 January 2008				
Country	**FIR**	**Amount of air traffic in the sample**	**Percentage of flights of the sample in the main city pairs**	**Number of city pairs**
Argentina	Córdoba	1769	51%	14
	Comodoro Rivadavia	713	65%	13
Bolivia	La Paz	684	60%	14
Brazil	Amazónica	4085	27%	14
	Brasilia	11333	28%	17
	Curitiba	10499	28%	16
	Recife	3418	31%	16
	Sao Paulo (TMA)*	1911	76%	15
Chile	Antofagasta	1480	70%	15
	Easter Island	164	89%	11
	Puerto Montt	412	94%	10
	Punta Arenas**	281	92%	8
	Santiago	2109	58%	13
Guyana	Georgetown	187	79%	10
Panama	Panama	1389	48%	15
Paraguay	Asunción	605	53%	13
Peru	Lima	3599	39%	16
Suriname	Paramaribo	369	71%	15
Uruguay	Montevideo**	892	75%	11

APPENDIX 1 TO CHAPTER 3

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APPENDIX 2 TO CHAPTER 3

HAZARD IDENTIFICATION AND RISK MANAGEMENT FORM

Hazard Identification and Risk Management Form

Type of operation or activity	Generic hazard	Specific component of hazard	Hazard-related consequence	Current risk control defences and risk index	Further action to reduce risk and the resulting risk index	Responsible party

APPENDIX 1 TO CHAPTER 4
SUMMARY TABLE OF HAZARD IDENTIFICATION AND RISK MANAGEMENT

Hazard Identification and Risk Management Form - ATSRO

Generic hazard 1	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Non-RNAV aircraft flying on RNAV routes	Inability of the aircraft to maintain RNAV route	**Loss of separation**	• Integrated Aeronautical Information System (AIP, NOTAM, AIP, AIC Supplement and others) • FPL • En-route navigation charts • ATS surveillance service • ACAS/TCAS • Operational manuals of the operator and the ANSP **3C**	• Direct access of ATS units to updated database of RNAV-approved aircraft • Improve surveillance in the necessary areas (implement VHF, HF, ADS-CPDLC, ADS-B, Radar and other types of communications) • Direct access of ARO/AIS units to updated database of RNAV-approved aircraft • Training of operators and air navigation service providers • Applicable contingency procedures upon identifying a non-RNAV aircraft on an RNAV route • Designate a responsible party in each State to maintain the database of RNAV-approved aircraft • Updating and, if applicable, development of the Operational Manuals of the ANSP, incorporating the appropriate procedures **2C**	States Operators ANSPs

Generic hazard 2	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Loss of RNAV capacity on board	Inability of the aircraft to maintain the RNAV route	**Loss of separation**	Alternate “conventional” navigation equipment Reversal to “conventional” navigation procedures ATS surveillance service ACAS • Operational manuals of the operator and the ANSP **3C**	Standardisation of operator procedures in case of loss of RNAV capability; Improve surveillance in the necessary areas (implement VHF, HF, ADS-CPDLC, ADS-B, Radar and other types of communications) Applicable contingency procedures upon identifying an aircraft that has lost RNAV capability Training of operators, including training of the crew in the application of contingency procedures Training of air navigation service providers ATC simulations RNAV system integrity oversight plan **2C**	States Operators ANSPs

Generic hazard 3	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Lack of GND NAVAID coverage	Inability of the aircraft to maintain RNAV route	**Loss of separation**	• GNSS • IRS/INS • ATS surveillance • Integrated Aeronautical Information System (AIP, NOTAM, AIP Supplement, AIC, etc.) • NOTAM concerning satellite health • ACAS • Operational manuals of the operator and the ANSP • Operational manuals of the operator and the ANSP **3C**	Standardisation of procedures for operators in case of inability to maintain the route; Ensure an appropriate coverage by: a) Implementing the required GND NAVAIDs; or b) Changing from a “conventional” route to an RNAV route, establishing the air navigation system requirements to fly the route. Improve surveillance in the required areas (implement VHF, HF, ADS-CPDLC, ADS-B, Radar and other types of communications) Training of operators and air navigation service providers Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating the appropriate procedures **2C**	States Operators ANSPs

Generic hazard 4	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
NAVAID coverage failure	Inability of the aircraft to maintain RNAV route	Loss of separation	• Reversal procedures: a) GNSS, in case of failure of GND NAVAIDs, for equipped aeroplanes b) Failure of IRS/INS, GND NAVAIDs, for equipped aeroplanes c) GND NAVAIDs, in case of GNSS and INS failure • Maintenance of GND NAVAIDs • NOTAM concerning satellite health • Flight inspection • Contingency procedures of the operator and the ANSPs. 3C	Standardisation of operator procedures in case the aircraft cannot maintain its route; Specific procedures to be applied in case of degradation of the navigation capability of the aircraft; Compliance with the Maintenance plan for the verification of ground radio aids; Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating the appropriate procedures Disseminating information about solar storms that might affect the satellite and HF systems 2C	States ANSPs Operators

Generic hazard 5	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Adverse meteorological effects	Large deviations	**Loss of separation**	• NOTAM • MET/PIB/VOLMET briefings • ATM briefings between ATFMUs • AIREP • Contingency plan • ACAS • Operational manuals of the operator and the ANSP **4C**	• Updating of LOAs between MET/ATM services • Alternate routes • QMS/MET/AIS • Updating of the operational manuals of the operator and the ANSP **2C**	States Operators ANSPs

Generic hazard 6	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Volcanic eruption	Volcanic ash Reduced availability of the route network	**Engine failure** **Increase of ATC workload**	ASHTAM MET/PIB/VOLMET briefings ATM briefings between ATFMUs AIREP Application of the procedures foreseen in Chapter 15 (15.8) of Doc 4444 Operational manuals of the operator and the ANSP Cancellation of operations on the affected routes 4C	• Re-routing of air traffic • Training of operators, including training of the crew on the application of contingency procedures • Determine ATC sector capacity • ATFM • Updating of LOAs between MET/ATM services • Develop regional contingency procedures • Alternate routes • Updating of the operational manuals of the operator • Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating the procedures foreseen in Chapter 15 (15.8) of Doc 4444 **(4D)**	States ANSPs Operators

Generic hazard 7	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Discrepancy of aeronautical information concerning the route network	Lack of integrity of the data published by the States	**Loss of separation**	• Use of WGS84 • ATS surveillance service • Integrated aeronautical information system (AIP, NOTAM, AIP Supplement, AIC, etc.) • ACAS	• Implement quality management system (QMS) in AIS • Comply with AIRAC cycles	States ANSPs
	Outdated airborne navigation database, if used		• Coordination between the States and the navigation database providers • Agreements between operators and navigation database providers • AIRAC cycles **4C**	• Comply with AIRAC cycles • Improve and/or formalise coordination between States and navigation database providers • Publish specific navigation database regulations • Schedule operator inspections • Comply with navigation database regulations established by the States **3C**	States Operators

Generic hazard 8	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Inadequate civil/military coordination	Unauthorised entry of civil aircraft in restricted airspaces Unauthorised entry of military aircraft from restricted airspaces into ATS routes	**Loss of separation**	• Civil/military LOA • Civil/military coordination committee • Integrated aeronautical information system (AIP, NOTAM, AIP Supplement, AIC, etc.) • Operational manuals of the ANSP • Video charts • Annex 2 and 11 Application of the procedures foreseen in Chapter 16 (16.1) of Doc 4444 • ACAS • ATS surveillance **3C**	• Updating of video charts • Updating of LOAs and general civil/military ATM procedures • ATFM • Training of ATCOs and pilots • Restructuring of segregated sectors/airspaces • Optimise or, if applicable, implement a civil/military coordination committee • Flexible use of airspace • Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating the procedures foreseen in Chapter 16 (16.1) of Doc 4444 and the standards and recommended practices of Annex 2 and 11. **2C**	States ANSPs

Generic hazard 09	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Inadequate airspace design	Increased ATCO workload	**Operational error of ATCO**	ATM/Airspace planning ATS surveillance Training of ATCOs SMS implementation standards (paragraph 2.27 of Annex 11) Capacity management (paragraph 3.1 of Doc 4444) **3D**	• Analyse sector workload after route optimisation • Provide a sufficient number of air traffic controllers • Drafting of the safety plan for sectors • ATFM • Updating of ATCO training • Analysis of airspace capacity after RNAV route optimisation • Airspace redesign applying continuous descent operations (CDO) • Implementation of RNAV SIDs/STARs **2D**	States ANSPs

Generic hazard 10	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Navigation deviations due to technical errors	Deviation due to engine failure	**Loss of separation**	• ATS surveillance • Safety assessment • Operational manuals of the operator and the ANSP • Aircraft and operator approval process **4C**	• Use of the lateral deviation (LD) reporting form • Monthly delivery of LD data to CARSAMMA • Training of ATCOs in the completion of the lateral deviation reporting form • Use of data available in CARSAMMA for visualising potential technical errors • Operator inspection programmes • Implement ATC system alarms to detect lateral deviations **2C**	States ANSPs Operators
	Deviation due to a contingency				

Generic hazard 11	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Navigation deviations due to operational errors	Lack of coordination between ACCs	**Loss of separation**	• Measures to reduce operational errors in the ATC coordination loop between adjacent ATCs (GREPECAS15/36) • ATS surveillance • Safety assessment • LOA • Operational manuals of the ANSP 4C	• Implement measures to reduce operational errors in the ATC coordination loop between adjacent ACCs (GREPECAS15/36) • Use of the lateral deviation (LD) reporting form • Investigation of each LD, taking the necessary risk mitigation measures, and monthly delivery of LD data to CARSAMMA • Training of ATCOs in the application of procedures to avoid ATC coordination errors and completion of the the lateral deviation reporting form • Use of data available in CARSAMMA to visualise potential errors • Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating procedures to reduce operational errors in the ATC coordination loop between adjacent ACCs • Implement ATC system alarms to detect lateral deviations • Implement AIDC 2C	States ANSPs

Generic hazard 12	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Outdated operational manuals of operators/ANSP	Erroneous application of procedures	**Loss of separation**	RNAV 5 approval procedures Safety oversight Audits and inspections **(4C)**	Implement SMS **(2C)**	States Operators ANSPs

APÉNDICE B

PROPUESTA DE ENMIENDA AL ANP CAR/SAM - VOLUMEN I - BÁSICO
Serie N° SAM 10/5 - ATM

a) **Plan**: Plan Regional de Navegación Aérea CAR/SAM, Volumen I, Básico (Documento 8733)

b) **Propuesta de Enmienda**:

Nota editorial: La enmienda está dispuesta de modo que el texto que debe suprimirse aparece tachado (~~que ha de suprimirse~~) y el texto nuevo, con sombreado (texto que ha de insertarse).

1. **Añadir,** según se describe a continuación, las siguientes rutas: **UM403; UM418; UM527; UM530; UM532; UM534; UM661; UM665; UM668; UM674; UM776; UM784; UM791; UM793; UM795.**
(Cf – Doc. 8733, Volumen I, Básico, Parte V - Apéndice A – Tabla ATS-1)

UM 403		
PUNTO SIGNIFICATIVO SIGNIFICANT POINT	*LATITUD LATITUDE*	*LONGITUD LONGITUDE*
ASUNCION	25° 14’ 39’’ S	057° 31’ 19’’ W
NILKI	24° 39’ 23’’ S	056° 52’ 10’’ W
SOSMO	23° 38’ 06’’S	055° 45’ 35’’ W
REBOX	23° 24’ 23’’S	055° 30’ 53’’ W
DUNCE	21° 27’ 15’’S	053° 28’ 33’’W
SIRIS	21° 01’ 51’’S	053° 01’ 49’’W
PUKIL	19° 41’ 16’’S	051° 40’ 23’’W
PAMEL	16° 54’ 40’’S	048° 59’ 09.6’’W
BRASILIA	15° 52’ 19’’S	048° 01’ 19’’W

UM 418		
PUNTO SIGNIFICATIVO SIGNIFICANT POINT	*LATITUD LATITUDE*	*LONGITUD LONGITUDE*
CORDOBA	31°18’47.6’’S	064°12’13.3’’W
MAVBI	31º15´38”S	063º08´11”W
UMSAR	31º08´19”S	061º13´21”W
RODOV	30º50’04”S	057º48’17”W
UBLAM	30º39’35”S	056º09’44”W
SIDUL	30º33´02”S	055º11´00”W
EKOGA	30º17´25”S	053º13´24”W
PORTO ALEGRE	29º59´45.6”S	051º09´54.6”W

UM 527		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
LIMA	S12°00'30'	W077 07'22''
SIGOB	S08°28'16''	W073°20'18''
AKTOR	S04°00'34''	W068°44'13''
MULIP	S02°29'53''	W067°12'10''
AKNOV	S00°50'33''	W065°20'47''
DOBDA	N04° 32'18''	W060°07'49''
TIMEHRI	N06°29'53''	W058°15'46''
UMREM	N07°56'06''	W057°00'03''
TRAPP	N09°05'06''	W055°59'30''

UM 530		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
RIO BRANCO	09° 52' 19'' S	067° 53' 44'' W
DADED	10° 08' 58''S	066° 53' 35'' W
BUVKI	10° 34' 35''S	065° 24' 46'' W
EQUAL	13° 45' 24''S	056° 06' 35'' W
ILSOT	14° 11' 39''S	054° 45' 34''W
SAMAR	14° 42' 47''S	053° 07' 10''W
MOSNA	15° 04' 40''S	051° 34' 25''W
OPLIK	15° 28' 38''S	049° 49' 22''W
BRASILIA	15° 52' 19''S	048° 01' 19''W

UM532		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
BRASILIA	15° 52' 19''S	048° 01' 19''W
SILOR	20° 56' 56''S	050° 45' 30''W
PRUDENTE	22° 10' 22''S	051° 25' 32''W
DIDOM	25° 17' 54''S	053° 11' 07''W
LODUR	26° 52' 56''S	053° 41' 13''W
CUARA	30° 22' 11''S	056° 26' 59''W

UM 534		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
ROSARIO	32º54’18”S	060º46’53”W
URURI	31º18’10”S	055º07’26”W
LOBOR	30º49´05”	053º39´07”W
OBLAD	30º22´16”S	052º17´02”W
PORTO ALEGRE	29º59´47”S	051º09´55”W

UM 661		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
CARRASCO	34° 49’ 57.78’’S	056° 01’ 30.47’’W
KILUM	34° 21’ 13’’S	055° 15’ 38’’W
TODAX	33° 23’ 17’’S	053° 46’ 02’’W
DAKIS	33° 13’ 28’’S	053° 31’ 12’’W
OPTUR	32º 50´ 57”S	052º 57´ 31”W
ROKAD	23° 23’ 13.8’’S	041° 56’ 31.8’’W
SIREL	20° 34’ 22.2’’S	039° 45’ 51.6’’W
MUDSA	18° 31’ 10.2’’S	038° 43’ 57.6’’W
VUKIR	01° 55’ 52.8’’S	029° 58’ 35.4’’W
ERETU	03° 07’ 42’’N	028° 48’ 00’’W

UM 665		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
GUAYAQUIL	02° 07’ 42’’S	079° 52’ 01’’ W
PUNAS	02° 47’ 36’’s	079° 54’ 43’’ W
CUENCA	02° 50’ 00’’ S	078° 55’ 00’’ W
KORBO	03° 01’ 00’’ S	077° 52’ 00’’ W
IQUITOS	03° 47’ 33’’S	073° 19’ 04’’ W

UM 668		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
LIMA	12° 00' 31" S	077° 07' 22" W
URCOS	13° 38' 58" S	071° 35' 11" W
OBLIR	14° 08' 42" S	068° 51' 18" W
TRINIDAD	14° 47' 57" S	064° 56' 17" W
GEDUS	15° 16' 54" S	060° 25' 30" W
CUIABA	15° 39' 22" S	056° 06' 43" W
GOIANIA	16° 37' 57" S	049° 12' 55" W
BRASILIA	15° 52' 26" S	048° 01' 17" W

UM 674		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
LIMA	12° 00’ 31’’S	077° 07’ 22’’ W
SALINAS	11° 17’ 15’’ S	077° 33’ 45’’ W
ATOGO	10° 24’ 31’’S	077° 57’ 24’’ W
EKUMO	03° 27’ 42’’ S	078° 19’ 48’’ W
CONDORCOCHA	00° 02’ 19’’S	078° 30’ 41’’ W
ENSOL	01° 19’ 51’’ N	078° 41’ 12’’ W
TUMACO	01° 48’ 53’’N	078° 44’ 53’’ W
TOKUT	05° 56’ 23’’N	079° 13’ 29’’ W
TABOGA	08° 47’ 18’’ N	079° 33’ 38’’ W

UM 776		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
CONDORCOCHA	00° 02’ 19’’S	078° 30’ 41’’ W
TERAS	02° 00’ 00’’ S	075° 56’ 00’’ W
IQUITOS	03° 47’ 33’’S	073° 19’ 04’’ W

UM784		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
LIMPO	04° 53’ 04’’S	072° 21’ 59’’W
MINUT	06° 41’ 49’’S	071° 29’ 36’’W
PANOL	08° 39’ 38’’S	070° 31’ 42’’W
KILEV	10° 58’ 54’’S	069° 06’ 04’’W
APARE	16° 50´ 27’’S	065° 48’ 36’’W
PILCO	22° 24’ 16’’S	062° 25’ 05’’ W
GETRA	24º08´04”S	061º18´40”W
RESISTENCIA	27° 26’ 49’’ S	059° 03’ 26’’ W

UM791		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
ADAMS	13°04’30´´ N	059° 29’00’’ W
OPLOP	09° 14’’12’’ N	054° 44’12’’ W
ISUTO	08° 37’06’’ N	054° 00’00’’ W 3
PANER	06° 42’36’’ N	051° 42’19’’ W
ARNAM	04° 44’00’’N	049° 38’03’’ W
ABUCU	04° 35’ 10’’ S	039° 08´48´´ W
ABASE	05° 43´48’’ S	037° 46’ 10’’ W
CAMPINA GRANDE	07° 16’00’’ S	035° 53’36’’ W
RECIFE	08° 08’ 16’’ S	034° 55’ 38’’ W

UM 793		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
LIMA	12° 00’ 31’’S	077° 07’ 22’’ W
AREQUIPA	16° 20’ 20’’S	071° 35’ 51’’ W
KOMPA	16° 28’ 30’’ S	069° 00’ 00’’ W
LA PAZ	16° 30’ 43’’ S	068° 14’ 01’’ W
COCHABAMBA	17° 25’ 17’’ S	066° 10’ 44’’ W
VIRU VIRU	17° 37’ 42’’ S	063° 09’ 00’’ W

UM 795		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
LIMA	12° 00’ 30’’S	077° 07’ 24’’ W
LOBOT	02° 56’32’’ S	077° 39’ 40’’ W
BOKAN	00° 48’21 ’’ N	077° 52’ 46’’ W
ILTUR	06° 50’21’’ N	078° 12’ 50’’ W
LA PALMA	08° 24’23’’ N	078° 08’ 19’’ W
OGRUL	10° 07’ 50’’N	078° 14’ 24’’ W
ENPAN	12° 10’ 13’’ N	078° 21’ 41’’ W
COLBY	15° 00’00’’ N	078° 31’ 59’’ W

2. **Realinear,** según se describe a continuación, las siguientes rutas: UA300; UA305, UA310; UA312; UA315; UA566; UB554; UB652; UG430; UG431; UG436; UG437; UL305; UL309; UM400, UM402, UM409; UM792; UR640.
(Cf – Doc. 8733, Volumen I, Básico, Parte V - Apéndice A - Tabla ATS-1)

UA300		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~MANAUS VOR~~	~~03º 09´02´´S~~	~~060º 03´02´´W~~
~~BOA VISTA~~	~~02° 51’ 08’’N~~	~~060° 41’ 13’’W~~
~~PAKON~~	~~04° 28’ 52’’N~~	~~061° 18’ 03’’W~~
GUAYANA	08º 17´36´´N	062º 45´11´´W
MATURIN	09° 44’ 36’’N	063° 09’ 11’’W
MARGARITA	10° 55’ 03’’N	063° 57’ 47’’W
KIKER	15° 05’ 50’N	065° 17’ 45’’W
DORADO	18° 28’ 00’’N	066° 24’ 42’’W
(KENNEDY)		

UA305		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
EZEIZA	34° 49’ 27’’ S	058° 32’ 07’’ W
DORVO	34° 42’ 58’’ S	057° 31’ 02’’ W
CARRASCO	34° 49’ 57.8’’S	056° 01’ 30.5’’ W
CAP. CURBELO	34° 51’ 29.9’’S	055° 05’ 30.2’’W
LITOS	34° 27’ 32’’S	054° 43’ 34’’W
TODAX	33° 23’ 17’’S	053° 46’ 02’’W
UGELO	32° 40’ 42’’S	053° 08’ 50’’W
PELOTAS	31° 43’ 09’’S	052° 19’ 38.4’’W
TIGRI	30° 34’ 28.8’’S	051° 33’ 01.26’’W
PORTO ALEGRE	29° 59’ 45.6’’S	051° 09’ 54.6’’W

UA310		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
MAR DEL PLATA	37° 55’ 47’’S	057° 34’ 35’’W
DARKA	35° 17’ 58’’S	056° 15’ 02’’W
CARRASCO	34° 49’ 57.8’’S	056° 01’ 30.5’’ W
~~MELO~~	~~32º 20´32.8”S~~	~~054º 13´ 19.1´´W~~
~~CURITIBA~~	~~25º 31´55.2S~~	~~049º 10´03.6W~~
~~SOROCABA~~	~~23º 30´25.8´´S~~	~~047º 22´41.4´´W~~

UA312		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~PORTO~~	~~22º 42´55´´S~~	~~042º 51´ 27´´W~~
~~FORMOSA~~	~~15º 33´27.6´´S~~	~~047º 20´49.2´´W~~
~~MEVOS~~	10° 24’ 06’’ S	050° 29’ 59’’ W
SANTAREM	02º 25´35´´S	054º 49´03´´W
ACARI	01° 57’ 26” N	056° 29’ 20” W
KOXAM	04° 58’ 48” N	057° 39’ 00” W
TIMEHRI	06° 29’ 31” N	058° 15’ 27” W
DALGA	08° 55’ 09” N	059° 04’ 40” W
FORT-DE-FRANCE	14° 35’ 26” N	061° 01’ 22” W
POINTE-A-PITRE	16° 15’ 55” N	061° 32’ 25” W
V.C. BIRD	17° 07’ 33” N	061° 48’ 01” W
ODKAM	17° 51’ 04” N	062° 14’ 12” W
GRANN	23° 30’ 00” N	065° 48’ 00” W

UA 315		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~ALTA FLORESTA~~	~~09° 52’ 00’’S~~	~~056° 06’ 18’’W~~
~~JACAREACANGA~~	~~06° 14’ 00’’S~~	~~057° 46’ 12’’W~~
~~MANAUS~~	~~03°02’12’’S~~	~~060°07’30’’W~~
~~VAGAN~~	~~03°49’09’’N~~	~~063°05’02’’W~~
~~UGRUL~~	~~07°47’03’’N~~	~~065°20’32’’W~~
~~TUY~~	~~10°17’42’’N~~	~~066°47’50’’W~~
MAIQUETIA	10°36’34’’N	066°59’23’’W
AVELO	11°25’06’’N	068°00’36’’W
CURACAO	12° 12’ 00’’ N	069° 00’ 24’’ W
VESKA	16° 00’ 00’’ N	070° 45’ 00’’ W
PIGBI	17° 33’ 12’’N	071° 43’ 00’’W
OBLEON	18° 26’ 12’’ N	072° 16’ 30’’ W
JOSES	20° 08’ 42’’ N	073° 13’ 00’’ W
GREAT INAGUA	20° 57’ 36’’ N	073° 40’ 36’’ W
BIMINI	25° 42’ 12’’ N	079° 17’ 42’’ W

UB554		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~FOZ DE IGUAZU~~	~~25° 35'00''S~~	~~54° 30' 13''W~~
~~OSITA~~	-	-
~~TEDAS~~	~~23° 52' 42''S~~	~~54° 34'30''W~~
~~CAMPO GRANDE~~	~~20° 28' 08''S~~	~~54°40'13''W~~
~~TOSAR~~	~~17°39'00''S~~	~~55° 31' 30''W~~
CUIABA	15º 39´22"S	056º 06´ 43´´W
UGINA	14° 36'36´´S	058° 22´24'' W
SILIC	11° 10' 39´´S	065° 22' 02' W
FLOTE	10° 17´20'' S	067° 05'39'' W
RIO BRANCO	09° 52'19'' S	067° 53'43'' W

UA 566		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~GUAYAQUIL~~	~~02° 07' 42''S~~	~~079° 52' 01'' W~~
~~KORBO~~	~~03° 01' 00'' S~~	~~077° 52' 00'' W~~
~~IQUITOS~~	~~03° 47' 33''S~~	~~073° 19' 04'' W~~
LETICIA	04° 11' 43''S	069° 56' 25''W
KENOK	03° 49' 42''S	067° 33' 36''W
TEFE	03° 22' 48''S	064° 43' 30''W
MANAUS	03º 02´24´´S	060º 03´16.8´´W

UB652		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~CUIABA~~	~~15º 39´22"S~~	~~056º 06´ 43´´W~~
~~SAN MATIAS~~	~~16º 19´ 48"S~~	~~058º 23´53´´W~~
VIRU VIRU	17º 37´ 42" S	063º 09´ 00´´W
SUCRE	19°00'22''S	065°17'30''W
~~KULPA~~	~~———~~	~~———~~
INCAS	21°45'38''S	068°06'25''W
CALAMA	22°30'01''S	068°52'37''W
MEJILLONES	23°06'33''S	070°26'35''W

UG 430		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~IQUITOS~~	~~03° 47’ 33’’S~~	~~073° 19’ 04’’ W~~
LEGUIZAMO	00° 10’ 43’’ S	074° 46’ 32’’ W
GIRARDOT	4° 11’ 30’’N	074° 51’ 57’’ W
CARTAGENA	10°12’30’’N	075°30’48’’W
KILER	15°00’00’’N	076°52’48’’W
MONTEGO BAY	18°30’31’’N	077°54’49’’W
PUTUL	19°58’48’’N	078°17’49’’W
AVILA	22°00’55’’N	078°48’54’’W
TANIA	24°01’48’’N	079°31’43’’W

UG 431		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~LIMA~~	~~12° 00’ 31’’S~~	~~077° 07’ 22’’ W~~
~~SALINAS~~	~~11° 17’ 15’’ S~~	~~077° 33’ 45’’ W~~
~~*TARAPOTO*~~	~~06° 39’ 29’’S~~	~~076° 21’ 04’’ W~~
~~LEGUIZAMO~~	~~00° 10’ 43’’ S~~	~~074° 46’ 32’’ W~~
GIRARDOT	4° 11’ 30’’N	074° 51’ 57’’ W
BOGOTA	04°50’48’’N	074°19’24’’W
BUVIS	05°31’54’’N	073°51’30’’W
BARRANCA BERMEJA	07°01’43’’N	073°48’18W
CUCUTA	07°56’00’’N	072°30’48’’W
ENPUT	08°12’24’’N	072°22’24’’W
SANTA BARBARA	08°58’48’’N	071°56’24’’W
ALCOT	11°54’42’’N	069°15’24’’W
CURACAO	12°11’48’’N	069°00’42’’W
SCAPA	15°50’00’’N	067°30’00’’W

UG 436		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~LIMA~~	~~12° 00’ 31’’S~~	~~077° 07’ 22’’ W~~
~~SALINAS~~	~~11° 17’ 15’’ S~~	~~077° 33’ 45’’ W~~
~~ARNEL~~	~~03° 24’ 00’’S~~	~~081° 35’ 00’’ W~~
LIXAS	01° 25’ 00’’ N	082° 56’ 12’’ W
RADIM	05° 49’ 18’’N	084° 08’ 48’’W
TIGIR	08° 28’ 12’’N	084° 56’ 06’’W
LIBERIA	10° 35’ 36’’N	085° 32’ 42’’W
AMATECAMPO	13° 24’ 42’’N	089° 08’ 18’’W
LA AURORA	14° 34’ 54’’N	090° 31’ 36’’W

UG 437		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~LIMA~~	~~12° 00’ 31’’S~~	~~077° 07’ 22’’ W~~
~~SALINAS~~	~~11° 17’ 15’’ S~~	~~077° 33’ 45’’ W~~
~~PADOX~~	~~4° 50’ 00’’S~~	~~079° 23’ 00’’ W~~
~~MACHALA~~	~~03° 17’ 42’’ S~~	~~079° 56’ 39’’ W~~
~~ESMERALDAS~~	~~00° 59’ 21’’N~~	~~079° 37’ 36’’ W~~
~~SISEL~~	~~01° 25’ 00’’ N~~	~~079° 37’ 18’’ W~~
~~UKLOS~~	~~05° 15’ 36’’N~~	~~079° 35’ 59’’ W~~
TABOGA	08° 47’ 18’’ N	079° 33’ 38’’ W
DUXUN	15° 00’ 00’’ N	079° 13’24’’W
GONIS	20° 00’ 00’’N	078°56’ 12’’W
AVILA	22°00’55’’N	078°48’54’’W
DYNAH	23°57’00’’N	077°56°48’’W
NASSAU	25°01’30’’N	077°26’48’’W
MAPYL	27°59’00’’N	075°59’00’’W
(SARJE)	-	-

UL305		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
LIMA	12° 00’ 31’’S	077° 07’ 22’’ W
~~SALINAS~~	~~11° 17’ 15’’ S~~	~~077° 33’ 45’’ W~~
AMVEX	10° 48’ 02’’S	076° 48’ 12’’ W
TERAS	02° 00’ 00’’ S	075° 56’ 00’’ W
PULTU	00° 04’ 00’’N	075° 34’ 48’’W
GIRARDOT	04° 11’ 30’’N	074° 51’ 57’’W
BARRANQUILLA	10° 47’ 48’’N	074° 51’ 37’’W

UL309		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
TABON	32°55’06’’S	070°50’14’’W
CALAMA	22°30’01’’S	068°52’37’’W
EMPEX	20°30’43’’S	068°39’54’’W
AROLO	19°05’31’’S	068°30’43’’W
LA PAZ	16º 30´43´´S	068º 14´01´´W
RIO BRANCO	09° 52’19’’ S	067° 53’43’’ W
~~DARUK~~	-	-
MULIP	02°29’54’’S	067°12’13’’W
GABRIEL	00º 09´02´´S	066º 59´07´´W
~~ZORRO~~	~~01º 51´48´´N~~	~~067º 12´07´´W~~
~~PTO AYACUCHO~~	05° 36’ 58.1’’N	067° 36’ 37.4’’ W
~~MAIQUETIA~~	~~10°36’37’’N~~	~~066°59’24’’W~~

UM400		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
CORDOBA	31°18’47.6’’S	064°12’13.3’’W
GEMOP	31° 01’ 17’’S	063° 11’ 17’’W
SIKOB	30° 10’ 27’’ S	060° 24’ 33’’ W
ARULA	28° 43’ 42’’ S	056° 08’ 34’’ W
ERVAS	28° 26’ 49’’S	055° 36’ 02’’ W
REKIR	28° 05’ 46’’ S	054° 37’ 50’’ W
~~POSADAS~~	~~27º 23’ 08”S~~	~~055º 58’ 09”W~~
~~LODUR~~	~~26º 52’ 56”S~~	~~053º 41’ 13”W~~
PERNA	26° 28’ 17’’ S	050° 20’ 01’’ W
PAKOV	25° 51’ 35’’S	048° 49’ 10’’ W
~~PARANAGUA~~	~~25° 32’ 05” S~~	~~048° 31’ 51” W~~
RONUT	25° 12’ 34’’S	047° 15’ 04’’ W
BITAK	23° 37’ 49’’S	043° 38’ 17’’ W
ALDEIA	22° 48’ 46’’S	042° 05’ 43’’ W

UM 402		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
PIARCO	10º 28´00´´N	061º 23´30´´W
ISIGI	09° 53’ 27.6” N	061° 20’ 11.4W
TELUR	06° 42’ 32.4” N	061° 02’ 20.4W

KUMIX	05° 24’ 29.55”N	060° 55’ 16.67”W
UDUSA	04° 42’ 06.09” N	060° 51’ 17.33”W
BOA VISTA	02º 51´08´´N	060º 41´ 13´´W
MANAUS	03° 02’ 12” S	060° 07’ 30” W
ARPAR	10º 29’ 52”S	059º 18’ 10” W
UBKAB	16° 18’ 54’’ S	058° 36´31’’ W
SIDAK	19° 38’ 21’’ S	058° 12’ 28’’ W
ASUNCIÓN	25° 14’ 39’’ S	057° 31’ 19’’ W
UPOVA	26° 04’ 22’’ S	057° 24’ 12’’ W
KONTO	26° 45’ 31.4’’ S	057° 18’ 13.5’’W
SIMOR	27° 27’ 19’’ S	057° 12’ 15’’ W
KIMIK	29° 32’ 04’’ S	056° 53’ 29’’ W
SEKLO	30° 06’ 29’’ S	056° 47’ 58” W
VUKAS	34º20’13”S/	056º 06’ 37” W
CARRASCO	34°49’57.78’’S	056°01’30.47’’W

UM409		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
FORMOSA	15° 33’ 28’’S	047° 20’ 49’’ W
POLAN	11° 49’ 41’’ S	050° 53’ 10’’ W
AKSON	10° 43’ 19’’ S	051° 53’ 02’’ W
DADOT	09° 47’ 18’’ S	052° 42’ 02’’ W
TEPEM	02° 33’ 43’’ S	059° 39’ 19’’ W
VUMPI	01° 59’ 23’’N	063° 56’ 55’’W
PUERTO AYACUCHO	05° 36’ 58.1’’N	067° 36’ 37.4’’ W
BARINAS	08° 37’ 00.3’’N	070° 13’ 13.9’’W
MARACAIBO	10° 34’ 52.9’’N	071° 42’ 52.9’’W

UM792		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~CONGONHAS~~	23° 37’ 36’’S	046° 39’ 19’’W
SOROCABA	23º 30´25.8´´S	047º 22´41.4´´W
~~PARANAGUA~~	25° 32’ 00’’S	048° 32’ 00’’W
CURITIBA	25º 31 ´55.2S	049º 10´03.6W
ASDEK	28º 35´ 41´´S	051º 20´ 29´´W
~~MILEX~~	----	-----
AKNEN	32° 00’ 27.6’’S	053° 53’ 14.4’’W
MELO	32º 20´32.8”S	054º 13´ 19.1´´W
CARRASCO	34° 49’ 57.8’’S	056° 01’ 30.5’’W

UR640		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
MANAUS	03° 02’ 12” S	060° 07’ 30” W
VUMPI	01° 59’ 23’’N	063° 56’ 55’’W
PUERTO AYACUCHO	05° 36’ 58.1’’N	067° 36’ 37.4’’ W
BARINAS	08° 37’ 00.3’’N	070° 13’ 13.9’’W
MARACAIBO	10° 34’ 52.9’’N	071° 42’ 52.9’’W
URIBI	11° 15’23’’N	071° 42’46’’W
EDROD	15° 00’ 00’’ N	074° 44’ 00’’W
KINGSTON	17° 56’ 00’’N	076° 47’ 00’’W
MONTEGO BAY	18° 30’ 00’’N	077° 55’ 00’’W
GRAND CAYMAN	19° 17’ 24’’N	081° 22’ 19’’W
MAMBI	19° 27’00’’N	082° 03’ 00’’W
DANUL	20°11’25’’N	085° 20’ 31’’W
COZUMEL	20°31’18’’N	086° 55’ 49’’W

3. **Suprimir,** según se describe a continuación, el requisito de las rutas UA308; UA309; UA314; UA316; UA432; UA565; UA566; UA568; UB449; UB561; UB677; UB695; UG426; UG680; UM778; UR558; UR560; UR563 en toda su extensión.
(Cf – Doc. 8733, Volumen I, Básico, Parte V - Apéndice A - Tabla ATS-1).

~~UA308~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~LA PLATA~~	~~34º 58´ 33´´S~~	~~057º 53´ 54´´W~~
~~DORVO~~	~~34º 42´58”S~~	~~057º 31´ 02´´W~~
~~MELO~~	~~32º 20´32.8”S~~	~~054º 13´ 19.1´´W~~
~~OGRUN~~	~~32º 03´43´´S~~	~~053º 50´34´´W~~
~~PORTO ALEGRE~~	~~29º 59´45.6´´~~	~~051º09´54.6´´W~~

~~**UA309**~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~CARRASCO~~	~~34° 49’ 57.8’’S~~	~~056° 01’ 30.5’’ W~~
~~UGURA (ATS/MET)~~	~~32° 36’18’’S~~	~~053°20’12’’W~~
~~PORTO ALEGRE~~	~~29º 59´45.6´´S~~	~~051º09´54.6´´W~~

~~UA314~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~EZEIZA~~	~~34º 49´27´´S~~	~~058º 32º 07W~~
~~PAPIX~~	~~34º24 ´58´´S~~	~~058º 00´02´´W~~
~~DURAZNO~~	~~33º 21´22.5´´S~~	~~056º29´45.8´´W~~
~~ISALA~~	~~31° 40’ 36’’S~~	~~054° 26’ 48’’W~~
~~BAGE~~	~~31º 23´26´´S~~	~~054º 06´35´´W~~
~~PORTO ALEGRE~~	~~29º 59´45.6´´S~~	~~051º09´54.6´´W~~
~~FLORIANOPOLIS~~	~~27º 40´12´´S~~	~~048º 32´26´´W~~
~~ETANO~~	~~24° 27’ 30’’S~~	~~044° 35’ 12’’W~~
~~MARICA~~	~~22º58´03.6´´S~~	~~042º53´28.8´´W~~
~~PORTO~~	~~22º 42´55´´S~~	~~042º 51´ 27´´W~~

~~UA316~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~VIRU VIRU~~	~~17º 37´ 42´´ S~~	~~063° 09’ 00´´ W~~
~~ILRES~~	~~13º 09´ 24´´ S~~	~~062° 21’ 12´´ W~~
~~BARGE~~	~~08° 22’ 12’’S~~	~~061° 21’ 18’’W~~
~~MANAUS~~	~~03º 02´24´´S~~	~~060º 03´16.8´´W~~

~~UA432~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~PORTO ALEGRE~~	~~29º 59´45.6´´S~~	~~051º09´54.6´´W~~
~~GAMOT~~	~~30º 56´40´´S~~	~~055º 29´37´´W~~
~~SALTO~~	~~31º 26´05.0´´S~~	~~057º 59´03.3´´W~~
~~VAPES~~	~~31º 40´39´´S~~	~~061º 33´15´´W~~
~~CORDOBA~~	~~31°18’47.6’’S~~	~~064°12’13.3’’W~~

~~UA 565~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~CONDORCOCHA~~	~~00° 02’ 19’’S~~	~~078° 30’ 41’’ W~~
~~TERAS~~	~~02° 00’ 00’’ S~~	~~075° 56’ 00’’ W~~
~~IQUITOS~~	~~03° 47’ 33’’S~~	~~073° 19’ 04’’ W~~
~~LETICIA~~	~~04° 11’ 43’’S~~	~~069° 56’ 25’’W~~

~~UA 566~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~GUAYAQUIL~~	~~02° 07’ 42’’S~~	~~079° 52’ 01’’ W~~
~~KORBO~~	~~03° 01’ 00’’ S~~	~~077° 52’ 00’’ W~~
~~IQUITOS~~	~~03° 47’ 33’’S~~	~~073° 19’ 04’’ W~~

~~**UA 568**~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~LA PAZ~~	~~16° 30’ 28’’S~~	~~068° 10’ 09’’ W~~
~~TRINIDAD~~	~~14° 47’ 57’’ S~~	~~064°56’ 17’’ W~~

~~**UB449**~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~GUALEGUAYCHU~~	~~33º 00´35´´S~~	~~058º 36´51´´W~~
~~MELO~~	~~32º 20´32.8”S~~	~~054º 13´ 19.1´´W~~

~~**UB 561**~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~RIO GRANDE~~	~~53° 46’ 31’’S~~	~~067° 44’ 45’’ W~~
~~TOGOR~~	~~53° 34’ 24’’ S~~	~~068° 36’ 38’’ W~~
~~PUNTA ARENAS~~	~~53° 00’ 13’’ N~~	~~070° 51’ 13’’ W~~

~~**UB 677**~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~LIMA~~	~~12° 00’ 31’’S~~	~~077° 07’ 22’’ W~~
~~ASIA~~	~~12° 45’ 38’’ S~~	~~076° 36’ 23’’ W~~
~~AREQUIPA~~	~~16° 20’ 20’’S~~	~~071° 35’ 51’’ W~~
~~KOMPA~~	~~16° 28’ 30’’ S~~	~~069° 00’ 00’’ W~~
~~CALAMARCA~~	~~-~~	~~-~~
~~COCHABAMBA~~	~~17° 25’ 17’’ S~~	~~066° 10’ 44’’ W~~
~~VIRU VIRU~~	~~17° 37’ 42’’ S~~	~~063° 09’ 00’’ W~~

~~UB695~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~ASUNCIÓN~~	~~25° 14’ 39’’ S~~	~~057° 31’ 19’’ W~~
~~KALAD~~	~~23° 43’ 12’’ S~~	~~055° 29’ 18’’ W~~
~~URUBUPUNGÁ~~	~~20° 46’ 36’’ S~~	~~051° 33’ 30’’ W~~

~~**UG 426**~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~LIMA~~	~~12° 00’ 31’’S~~	~~077° 07’ 22’’ W~~
~~SALINAS~~	~~11° 17’ 15’’ S~~	~~077° 33’ 45’’ W~~
~~CHACHAPOYAS~~	~~06° 12’ 01’’S~~	~~077° 51’ 36’’ W~~
~~MIRLO~~	~~03° 32’ 00’’ S~~	~~078° 15’ 00’’ W~~
~~CONDORCOCHA~~	~~00° 02’ 19’’S~~	~~078° 30’ 41’’ W~~
~~ENSOL~~	~~01° 19’ 51’’ N~~	~~078° 41’ 12’’ W~~
~~TUMACO~~	~~01° 48’ 53’’N~~	~~078° 44’ 53’’ W~~
~~TOKUT~~	~~05° 56’ 23’’N~~	~~079° 13’ 29’’ W~~
~~TABOGA~~	~~08° 47’ 18’’ N~~	~~079° 33’ 38’’ W~~

~~**UG680**~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~BAGE~~	~~31º 23´26´´S~~	~~054º 06´35´´W~~
~~TULIO~~	~~31º 32´23´´S~~	~~054º 30´01´´W~~
~~GUALEGUAYCHU~~	~~33º 00´35´´S~~	~~058º 36´51´´W~~
~~ROSARIO~~	~~32º54’18”S~~	~~060º46’53”W~~

~~**UM778**~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~ELORZA~~	~~07º 03´30.0´´N~~	~~069º 29´31.3´´W~~
~~PALIR~~	~~06º 07´42´´N~~	~~069º 10´03´´W~~
~~ATATU~~	~~02º 02´01´´S~~	~~067º 46´40´´W~~
~~SAO GABRIEL DA CACHOEIRA~~	~~00º 09´02´´ S~~	~~066º 59´07´´ W~~

~~UR558~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~LA PAZ~~	~~16º 30´43´´S~~	~~068º 14´01´´W~~
~~GRAFO~~	~~10º 38´34´´S~~	~~067º 56´01´´W~~
~~RIO BRANCO~~	~~09º 52´19´´S~~	~~067º 53´44´´W~~

~~UR560~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~JUJUY~~	~~24º 23´37´´S~~	~~065º 05´34´´W~~
~~KADAT~~	~~23° 23’ 30’’S~~	~~067° 08’ 00’’ W~~
~~CALAMA~~	~~22° 30’ 01’’ S~~	~~068° 52’ 37’’ W~~
~~IQUIQUE~~	~~20° 34’ 16’’ S~~	~~070° 11’ 00’’ W~~

~~UR563~~		
PUNTO SIGNIFICATIVO *SIGNIFICANT POINT*	*LATITUD* *LATITUDE*	*LONGITUD* *LONGITUDE*
~~PORTO ALEGRE~~	~~29º 59´45.6´´S~~	~~051º09´54.6´´W~~
~~GEBUN~~	~~26° 34’ 40’’ S~~	~~053° 46’ 46’’ W~~
~~FOZ~~	~~25º 35´00”S~~	~~054º 30´ 13´´W~~

c) **Originada por**: Argentina, Bolivia, Brasil, Chile, Colombia, Ecuador, Guyana Francesa, Guyana, Panamá, Paraguay, Perú, Suriname; Trinidad y Tobago, Venezuela; Uruguay, e IATA.

d) **Razones del originador para la enmienda**:

Como producto del Primer y Segundo Taller/Reunión de Optimización de la Red de Rutas ATS SAM (ATSRO/1 y ATSRO/2) y por la revisión realizada posteriormente por la Reunión SAM/IG/5, los Estados que originan esta propuesta de enmienda, en coordinación con los usuarios representados por IATA, han acordado que estas rutas RNAV se incluyan en el programa de optimización de la estructura de rutas ATS SAM y por lo tanto, se encuentran listas para su implantación, realineación o eliminación según el caso.

Todas ellas formaran parte de la red de rutas ATS del ANP CAR/SAM, Volumen I, Básico. La implantación de las nuevas rutas y los cambios realizados a las trayectorias antes citadas, permitirán obtener una disminución de distancia y tiempo de vuelo, con el consiguiente ahorro de combustible, costos de operación y protección del medio ambiente.

e) **Fecha propuesta de implantación**:
A partir de, por lo menos, dos ciclos AIRAC después de que la propuesta de enmienda haya sido aprobada por el Consejo de la OACI, en concordancia con los programas de implantación específicos que para tal efecto establezcan particular y coordinadamente los Estados/Territorios/Organizaciones Internacionales.

f) **Propuesta circulada a los siguientes Estados/Territorios y Organizaciones**:

Alemania
Anguilla (Reino Unido)
Antigua y Barbuda
Antillas Francesas (Francia)
Antillas Neerlandesas (Países Bajos)
Argentina*****
Aruba (Países Bajos)
Bahamas
Barbados
Belice
Bermuda (Reino Unido)
Bolivia*****
Brasil*****
Canadá
Chile*
Colombia*****
Costa Rica
Cuba
Dominica
Ecuador*
El Salvador
España
Estados Unidos
Francia
Guayana Francesa (Francia)*
Granada
Guatemala
Guyana*
Haití
Honduras
Islas Caimanes (Reino Unido)
Islas Turcas y Caicos (Reino Unido)
Islas Vírgenes (USA)
Islas Vírgenes Británicas (Reino Unido)
Italia
Jamaica
México
Montserrat
Nicaragua
Países Bajos
Panamá*****
Paraguay*
Perú*
Puerto Rico (USA)
Reino Unido
República Dominicana
San Kitts y Nevis
San Vicente y las Granadinas
Santa Lucía
Suriname*
Trinidad y Tabago*
Uruguay*
Venezuela*

.Organismos Internacionales
COCESNA
IATA*

***** Para información

g) **Comentarios de la Secretaría**:

1) La reestructuración de la Red de Rutas ATS contenidas en el Plan de Navegación Aérea Básico de las Regiones CAR/SAM se enmarca dentro del proceso de evolución de la ATM en las Regiones CAR y SAM que fuera aprobado mediante las Recomendaciones 5/14, 5/15 y 5/16 de la Reunión RAN CAR/SAM/3.

2) Las trayectorias han sido configuradas teniendo presente la implantación de la PBN en la Región SAM , el ahorro de combustible, la economía de las operaciones y la protección del medio ambiente; lo cual permitirá un uso más amplio de dichas rutas beneficiando a un mayor número de usuarios del espacio aéreo en cuestión.

3) La implantación, re-alineamiento, como también la eliminación de las rutas ATS presentadas en esta propuesta de enmienda, optimizarán la estructura de la red de rutas ATS CAR/SAM y dejará preparada a la Región SAM para continuar con el programa de optimización de la estructura del espacio aéreo y la introducción de mejoras adicionales a fin de responder a los requerimientos actuales y futuros de los usuarios.

APPENDIX C

ACTION PLAN FOR OPTIMISING THE ATS ROUTE NETWORK IN THE SOUTH AMERICAN REGION (GPIs 1, 5, 7, 8, 10, 11)

Activity	Start	End	Responsible party	Observations
1. **Phase One – RNAV-5 Implementation**				
1.1. RNAV-5 implementation in the SAM Region	**Apr 2008**	**Sep 2011**	**Regional Project RLA/06/901**	**Valid** The implementation will be carried out according to the Implementation Programme approved at SAM/IG/2 meeting
2. **Phase Two – Implementation of Version 01 of the SAM ATS Route Network**				
2.1. Conduct a Feasibility Study for Optimising the SAM Route Network	March 2009	Apr 2009	Regional Project RLA/06/901	**Completed**
2.2. Airspace Concept				
2.2.1 Collect traffic data to understand air traffic flows	June 2008	SAM/IG/4	SAM/PBN/IG (Project RLA/06/901) States	**Completed** Task 1.2 o RNAV5 implementation project. The Secretariat will send a request to States for data collection using Attachment 2 of Appendix A in Excel format.
2.2.2 Analyse the fleet navigation capacity	June 2008	SAM/IG/4	SAM/PBN/IG (Projects RLA/06/901 and RLA/99/901) States-IATA	**Completed** Task 1.3 of RNAV-5 Implementation Project
2.2.3 Determine the gateways of the main TMAs in the SAM Region	**SAM/IG/3**	**SAM/IG/4**	**States**	**Completed**

Activity	Start	End	Responsible party	Observations
2.2.4 Determine and obtain the necessary tools to make the studies related with the ATS routes network (aeronautical charts, specific software)	SAM/IG/3	SAM/IG/5	SAM/PBN/IG (Project RLA/06/901)	**Completed**
2.2.5 Make a detailed study of the SAM ATS route network, with a view to preparing version 1 of the route network, including the following:	SAM/IG/4	March 2010	SAM/PBN/IG (Project RLA/06/901)	**Completed** WP/06 presents draft proposal for amendment to the CAR/SAM ANP, containing regional routes of Version 02 of the routes network, as a result of the activities carried out so far for ATS routes network optimisation.
• Indicate the domestic and international ATS routes that should be eliminated, in accordance with their use;	Completed			
• Indicate the “conventional” RNAV routes that should be eliminated or replaced by RNAV routes in the exclusionary RNAV-5 airspace.	Completed			
• Indicate the RNAV routes that should be realigned, in accordance with the gateways of the main SAM TMAs (see 2.2.3).	Completed Version 1			
• Describe in detail the proposed new SAM route network, based on the analysis of the aforementioned items.	Completed Version 1			
2.2.6 Detail the interphase between the SAM routes network and the CAR routes network		**Completed**		**Completed**

Activity	Start	End	Responsible party	Observations
2.2.7 Propose initial draft proposal for amendment to the CAR/SAM ANP		Valid		**Completed** Proposal for amendment is presented in WP/06
2.2.8 Prepare safety assessment required, applying a qualitative methodology through the use of SMS	April 2010	October 2010	Project RLA/06/901	**Completed** Safety assessment and the corresponding safety plan for ATSRO is presented in WP/03.
2.2.9 Hold the Workshop of Experts from the SAM States to review and validate the study made under item 2.2.5 and 2.2.6.	SAM/IG/5	June 2010	SAM/PBN/IG (Project RLA/06/901) States	**Completed** The Second Workshop was carried out from 23 to 27 August 1 to 5 March 2010, in Lima, Peru.
2.2.10 Carry out the second workshop of SAM States experts, in order to review and validate the study of item 2.2.5 and 2.2.6	SAM/IG/5	August 2010	Regional Project RLA/06/901	**Completed** The Second Workshop was carried out from 23 to 27 August 2010, in Lima, Peru.
2.2.11 Update LOAs among involved ACCs	SAM/IG/5	November 2010		**Valid** Most of the States have updated their letters of agreement.
2.3 Implementation of Version 1 of the SAM ATS Route Network				
2.3.1 Process the proposal of amendment to the CAR/SAM Air Navigation Plan	September 2010		SAM Regional Office	**Completed** SAM/IG/6 reviewed the proposal for amendment and will immediately circulate it among States and International organizations involved.
2.3.2 Present proposal for amendment	November 2010		ICAO – ANP	**Valid**
2.3.3 Publish version 01 of the SAM ATS Route Network	November 2010		States ICAO ANP	**Valid**
2.3.4 Entry into effect of version 01 of the SAM ATS Route Network	The dates will be defined during the second ATSRO Workshop. March 2011 has been defined.		States	**Valid**

Activity	Start	End	Responsible party	Observations
3. **Phase Three – Implementation of Version 2 of the SAM ATS Route Network**				
3.1. **Flexible Use of Airspace**				
3.1.1. Develop guidance material for the application of the Flexible Use of Airspace concept, including: • Model for using non-permanent routes similar to that applied in EUROCONTROL (Conditional Routes – CDR). • Criterion for defining scenarios in which non-permanent routes are applied • Criterion for categorising non-permanent routes • Harmonised publication of non-permanent routes • Representation of non-permanent routes in aeronautical charts	SAM/IG/7	SAM/IG/8	SAM/PBN/IG (Project RLA/06/901)	**Valid**
3.1.2. Establish the Civil-Military Coordination Committee to evaluate application of the Flexible Use of Airspace concept mentioned in 3.1.1.	SAM/IG/7	SAM/IG/8	States	**Valid** The Civil/Military Committees should be implemented in those States which have not done so. Plan Civil/Military Meeting/Workshop in 2011. A Seminar has been planned to be held from 13 to 17 June 2011, the hosting of RLA/06/901 will be requested at the RCC/4 Meeting.
3.1.3. Develop proposals for route implementation and/or realignment, in keeping with the utilisation of FUA	SAM/IG/8	SAM/IG/9	States	**Valid** See 3.1.2
3.2. **Airspace Concept**				
3.2.1. Collect traffic data to understand air traffic flows	SAM/IG/7	SAM/IG/8	SAM/PBN/IG (Project RLA/06/901) States	**Valid**

Activity	Start	End	Responsible party	Observations
3.2.2. Analyse the fleet navigation capacity	SAM/IG/7	SAM/IG/8	SAM/PBN/IG (Projects RLA/06/901 and RLA/99/901) States IATA	**Valid**
3.2.3. Determine the gateways of the main TMAs in the SAM Region	SAM/IG/7	SAM/IG/8	States	**Valid**
3.2.4. Determine the necessary tools for making the study mentioned in item 3.2.5 (aeronautical charts, specific software)	SAM/IG/6	SAM/IG/7	SAM/PBN/IG (Project RLA/06/901)	**Valid**
3.2.5. Make a detailed study of the SAM ATS route network with a view to developing version 2 of the route network, including: • Definition of scenarios for the SAM airspace structure, including ATS routes, control sectors, TMA interface, for assessment using airspace modelling and fast-time ATC simulation tools. • Indicate the ATS routes that should be eliminated in accordance with their utilisation; • Propose, if necessary, the extent of exclusionary airspace volume for RNAV-5 application • Indicate, as necessary, the “conventional” ATS routes that should be eliminated or replaced by RNAV routes in accordance with the possible extension of the exclusive RNAV-5 airspace volume. • Indicate the RNAV routes that should be realigned in keeping with possible modifications to the gateways of the main	SAM/IG/7	December 2011	SAM/PBN/IG (Project RLA/06/901)	**Valid** It is expected to carry out the third ATSRO workshop from 4 to 8 July 2011.

Activity	Start	End	Responsible party	Observations
TMAs in the SAM Region. • Detail possible scenarios for version 2 of the SAM route network and of control sectors, based on the analysis of the previous items • Detail the interface between the SAM route network and the CAR route network • Propose the initial draft Proposal of Amendment to the CAR/SAM ANP.				
3.2.6. Prepare a safety assessment and routes spacing	SAM/IG/7	July 2011	CARSAMMA	**Valid** Quantitative assessment in order to determine spacing between routes to be applied in item 3.2.5
3.2.7. Make Airspace Modelling and Fast-Time Simulation studies to assess the scenarios developed in 3.2.5	August 2011	SAM/IG/9		**Valid**
3.2.8. Hold the Workshop of Experts from the SAM States to review and validate the studies made in items 3.2.5, 3.2.6, and 3.2.7.	SAM/IG/9	August 2012	Project RLA/06/901 States	**Valid** The SAM ATSRO/4 Workshop is expected to be held in August 2012.
3.3. **Implementation of Version 2 of the SAM ATS Route Network**				
3.3.1. Process the proposal of amendment to the CAR/SAM Air Navigation Plan	October 2012		SAM Regional Office	**Valid**
3.3.2. Publish version 01 of the SAM ATS Route Network	November 2012		States ICAO (ANP)	**Valid**
3.3.3. Entry into effect of version 2 of the SAM ATS Route Network	First half 2013		States	**Valid**

APPENDIX D

ATS ROUTES STRUCTURE OPTIMISATION

IATA

1.1 Taking into consideration the result of the 36th ICAO Assembly and the ALLPIRG/5 Meeting, during the SAM/IG/3 Meeting (Lima, April 2009), through Conclusion SAM/IG/3-1 it was approved that SAM Region States take pertinent actions and follow the guidelines established in the SAM ATS routes Optimisation Programme.

1.2 In this connection, it was concluded in the SAM Region that this ATS routes optimisation should be carried out in phases, taking into account the analysis/diagnosis of the ATS route network and planning criteria reflected in the SAM Region ATS routes optimisation programme.

1.3 The SAM ATSRO/1 Meeting, taking into account the magnitude of the work made, deemed pertinent that SAM States and IATA evaluate more thoroughly the results of the work carried out in this workshop and present the results to the SAM/IG/5 Meeting.

1.4 All modifications requested were analysed and agreed upon during the First SAM ATS Routes Network Optimisation Workshop carried out in Lima in March 2010, where term, trajectories, boundaries, directions and all necessary details to implement these modifications within the Argentinean airspace, were agreed.

1.5 In a Collaborate Decision Making (CDM), these modifications were agreed these modifications were agreed among the Regional Directorates involved of Argentina and IATA operators. At the meeting carried out in April 2010, the Air Navigation Department Heads, together with the Argentinean ANAC Directors, agreed also on the terms required to facilitate implementation of these RNAV routes in a short term.

1.6 It is important to highlight the good working relationship and cooperation that one IATA operator (LAN Argentina) has established through a cooperation agreement signed with ANAC Argentina for Performance-Based Navigation (PBN) in Argentina on 21 December 2009. This implementation shall enable the Argentinean airspace use optimisation, respecting the current regulations, improving air safety for all operators using these routes from or to Argentina.

1.7 As per the above, the RNAV routes realignment is proposed as per **Attachment 1 and 2** to this Appendix.

1.8 Also, it is important to emphasize that with these new routes the Argentinean airspace will be cleared and regional flights will be optimised and national flights will be more flexible, flight time and fuel consumption will be reduced; and consequently, the use of non-renewable resources will be rationalised and environment will be taken care of, significantly reducing contaminating gas emissions (CO_2) to the atmosphere.

1.9 This proposal has been carried out taking into consideration ICAO Strategic Objectives C – *Environment Protection* and D – *Efficiency*.

ATTACHMENT 1

The routes to be modified are as follows:

1. RNAV MCS DIRECTO ALDOS
2. RNAV TOSOR DIRECTO UMKAL
3. RNAV BIXIM DIRECTO ROPON
4. RNAV ALBAL DIRECTO ASADA
5. RNAV ATOVO DIRECTO TUC
6. RNAV ROSARIO DIRECTO ASISA
7. RNAV KAMUV DIRECTO SNT
8. RNAV LIMAY DIRECTO ASADA
9. UT653 MJZ DIRECTO PAMAL
10. RNAV DIL DIRECTO RGL
11. RNAV DIL DIRECTO CRV

RUTA	TRAMO	MODIFICACION	ACTUAL NM	MODIF	AHORRO	ACTUAL FUEL	MODIF	AHORRO	ACTUAL TIME	MODIF	AHORRO	ACTUAL C02	MODIF	AHORRO
AEP-IGR	DCT MCS-ALDOS	AEP-IGR DCT MCS LUCIA'!A1	622	616	**6**	4091	4052 KG	**39 KG.**	01:26	01:26	**00:00**	12,9 tn	12,8tn	**0,1 tn**
IGR-AEP	DCT ALDOS - MC	AEP-IGR DCT MCS LUCIA	600	594	**6**	4263	4232	**31**	01:32	01:32	**00:00**	13.4	13.3	**0.1**
EZE-SCL	DCT TOSOR-UMK	EZE-SCL (TOSOR UMKAL)	695	691	**4**	5081	5060	**21**	01:49	01:49	**00:00**	16.5	15.9	**0.6**
AEP-NEU	DCT BIXIM-ROPO	AEP NQN (DCT BIXIM-ROPON)	587	581	**6**	4354	4324	**30**	01:34	01:32	**00:02**	13.7	13.5	**0.2**
SCL-EZE	DCT ALBAL-ASA	SCL-EZE	649	647	**2**	4004	3988	**16**	01:28	01:28	**00:00**	12.64	12.6	**0.04**
AEP-TUC	DCT ATOVO-TUC	AEP-TUC	610	605	**5**	4371	4342	**29**	01:33	01:32	**00:01**	13.8	13.7	**0.1**
AEP-SLA	DCT ATOVO-TUC	AEP-SLA	728	723	**6**	5096	5073	**23**	01:53	01:53	**00:00**	16.1	16	**0.1**
EZE-LIM	DCT ATOVO-TUC	EZE-LIM	1795	1790	**5**	11829	11805	**24**	04:16	04:16	**00:00**	37.3	37.3	**0**
AEP-COR	DCT ROSARIO-AS	AEP COR (DCT ROS - ASISA)	404	402	**2**	3183	3172	**11**	01:05	01:05	**00:00**	10	9.9	**0.1**
MDZ-AEP	DCT KAMUV-SNT	MDZ-AEP	542	538	**4**	3453	3430	**13**	01:16	01:15	**00:01**	10.9	10.87	**0.03**
BRC-AEP	DCT LIMAY - AS	BRC AEP (DCT LIMAY - ASADA)	779	773	**6**	4706	4667	**39**	01:46	01:45	**00:01**	14.8	14.7	**0.1**
AEP-UAQ	via UT653 til MJ d	AEP UAQ	596	595	**1**	4410	4404	**6**	01:34	01:34	**00:00**	13.9	13.85	**0.05**
AEP-RGL	DCT DIL-RGL	AEP-RGL DCT DIL-RGL	1212	1185	**27**	8090	7934	**156**	03:00	02:57	**00:03**	25.4	24.9	0.5
RGL-AEP	DCT RGL-DIL	RGL-AEP DCT RGL-DIL	1179	1169	**10**	7185	7120	**65**	02:41	02:40	**00:01**	22.6	22.4	**0.2**
AEP - CRV	DCT DIL - CRV	AEP-CRV-AEP	846	832	**14**	5851	5744	**107**	02:09	02:07	**00:02**	18.4	18.1	**0.3**

APÉNDICE / APPENDIX E
(disponible solamente en inglés)

THE NEED FOR ETOD INFORMATION FROM AN INDUSTRY PERSPECTIVE AND ASTER GDEM TERRAIN DATA SUITABILITY TO FULFIL ICAO MEMBER STATES'S ANNEX 15, CHAPTER 10 AVIATION REQUIREMENTS

(Presented by Jeppesen)

1. ELECTRONIC TERRAIN AND OBSTACLE DATA

1.1 BACKGROUND

Amendment 33 to ICAO Annex 15 introduced requirements for States to ensure that electronic sets of Terrain and Obstacle data (eTOD) are made available. The data shall be made accessible for four distinct coverage areas, ranging from the entire territory of the State (Area 1) through to the precision approach areas at an aerodrome (Area 4) with each area having differing data collection requirements.
The new provisions in Annex 15 on the subject of electronic terrain and obstacle data are based on work done by ICAO with RTCA SC 193 and EUROCAE WG 44 industry groups as well as on comments received from States during the amendment process.

These new provisions deal with the electronic terrain and obstacle data function, coverage, obstacle numerical requirements, content and structure of terrain and obstacle databases (defined as two separate databases), data product specifications for terrain and obstacle data and their availability.

1.2 DEFINITION OF COVERAGE AREA 1, 2, 3 and 4

In order to satisfy identified user requirements for electronic terrain and obstacle data, while taking into account cost-effectiveness, acquisition methods and data availability, the data are to be provided according to the following four coverage areas definition:

1.2.1 AREA 1

a) Terrain:
- State territory excluding the geographical footprint of Area 3 & 4 and some portions of Area 2;
- Between 10km from ARP extending to the TMA boundary or 45km radius whichever is smaller, terrain not penetrating the horizontal plane of 120m above lowest THR elevation;
- Those portions of Area 2 where flight operations are prohibited;

b) Obstacles:
- Entire State territory all obstacles having minimum height of 100m AGL;
- Those portions of Area 2 where flight operations are prohibited;

1.2.2 AREA 2

a) Terrain:
- Within 10km from ARP;
- Between 10km from ARP extending to the TMA boundary or 45km radius whichever is smaller, terrain penetrating the horizontal plane of 120m above lowest THR elevation;

b) Obstacles:
- Conical surface whose origin is at the edges of the 180m wide rectangular area and at nearest runway elevation measured along the runway centreline, extending at 1.2% until reaches 120m above lowest runway elevation of all operational runways at the airport;
- Between 10km from ARP extending to the TMA boundary or 45km radius whichever is smaller, the horizontal plane of 120m above lowest THR elevation;

1.2.3 AREA 3

a) Terrain:
- Area adjacent to the movement area and extending from the edges of the runways up to 90m from runway centreline and for the rest of the movement area 50m from its edges;

b) Obstacles:
- Within same horizontal limits as above, all obstacles and terrain that raise higher than 0.5m above the horizontal plane passing through the nearest point of the movement area;

1.2.4 AREA 4

a) Terrain:
- Rectangular area of 60m each side of the extended runway centreline with the length of 900m extending from the runway threshold. This area is restricted to CAT II/III precision approach runways.

b) Obstacle:
- *Not required*;

2. TERRAIN AND OBSTACLE DATA APPLICATIONS

2.1 BACKGROUND

There is an emerging need for the development of digital aviation databases which are required to support the implementation of communications, navigation and surveillance/air traffic management (CNS/ATM) systems. During the past several years, there has been an increasing awareness within the aviation community that digital, computer-based avionics can be used to provide flight crew with additional information to support better, more balanced decisions.

Situational awareness is the term that best describes the ability of pilots to know what is going on in relationship to their aircraft and the external environment. The underlying philosophy is to make additional but relevant information available to pilots in order to assist them in their decision-making process. At the heart of a cockpit-centred situational awareness architecture is an advanced data management computer system. Beside the functions provided by existing avionics systems to fly the aircraft and to select optimized flight tracks as prescribed by procedure designers, the advanced CNS on-

board system can support thru digital aviation databases a variety of new cockpit-based operational applications.

The “core” aviation databases include navigation, terrain, obstacles, aerodrome maps, airspace, and noise abatement procedures. Additional supportive aviation databases may also need to be developed and standardized in the future.

2.2 NAVIGATION APPLICATIONS USING TERRAIN & OBSTACLE DATA

Significant safety benefits for international civil aviation will be provided by in-flight and ground based applications that rely on quality electronic terrain and obstacle data. Terrain and obstacle databases can sustain two-dimensional (2-D), three-dimensional (3-D) and four-dimensional (4-D) predictive Controlled Flight into Terrain (CFIT) prevention systems as well as Approach and Landing Accident Reduction (ALAR) systems.

Sets of electronic terrain and obstacle data used in combination with relevant aeronautical data shall support the following air navigation applications:

2.2.1 COCKPIT-BASED APPLICATIONS

- Ground Proximity Warning System (GPWS) with forward looking terrain avoidance function;
- En-route “drift-down” procedures;
- En-route emergency landing location selection and,
- Synthetic vision;

2.2.2 GROUND-BASED OR GROUND-USED APPLICATIONS

- Minimum Safe Altitude Warning (MSAW) system;
- Instrument procedure design (including curved i.e. RF leg based approach procedures);
- Contingency procedure analysis (one-engine inoperative departure climb profile, etc);
- Flight simulator and,
- Aeronautical chart production.

2.2.3 AERODROME MAPPING DATA APPLICATIONS

Based on the availability of a standardized aerodrome mapping data set, a wide variety of applications can be envisioned. Note that several of the applications listed below can be used by multiple user classes e.g. pilots, Air Traffic Controllers, airline, Cargo, Business/General aviation, vehicle operators, etc:

- Map display information;
- Taxi guidance display information;
- Surveillance and conflict/runway incursion detection/alerting;
- Route/Hold-short portrayal and deviation detection/alerting;
- Advanced Surface Movement Guidance and Control System (A-SMGCS);
- Portrayal of D-ATIS information;
- D-NOTAMs with aeronautical data overlays;

3. FUNCTIONS OF eTOD AREA 1 AND 4

From the diversity of cockpit and ground-based set of applications where terrain and obstacle data play a significant role and which are listed in paragraph 2 above, this information paper will now continue to emphasize the respective functions supported by eTOD datasets collected and recorded in databases in accordance with coverage Area 1 and 4. According to ICAO Annex 15, paragraph 10.6 '*Availability*' member States looking for compliance with Chapter 10, Annex 15 requirements shall ensure that terrain Area 4 and terrain & obstacle Area 1 data are made available already as of 20 November 2008.

3.1 eTOD AREA 1 APPLICATIONS

3.1.1 TERRAIN AWARENESS AND WARNING SYSTEM (TAWS)

Ground Proximity Warning System (GPWS) technology with forward-looking capabilities provides flight crew with information of impending dangerous terrain and obstacles. This will result in earlier alerts and more time to take appropriate corrective action. New multifunction displays are merging terrain and obstacle databases, aircraft GNSS and Flight Management System sensor data.

Many qualified terrain warning systems use digitized terrain data intended for advisory use only since these data sets are not certified for navigation use as they lack stringent quality requirements (integrity). Consequently, there is a significant safety benefit made possible by developing a comprehensive terrain and obstacle database.

3.1.2 MINIMUM SAFE ALTITUDE WARNING (MSAW) SYSTEM

MSAW systems use ground-based radar to monitor the flight paths of aircraft equipped with encoding transponders to ensure adequate terrain and obstacle separation. The alerting function is accomplished by comparing the flight paths with a three-dimensional grid map stored in the ground-based radar system. If a potentially unsafe condition is detected, the controller will alert the pilot by radio. This operational application is a flight critical safety application as air traffic relies on this data to provide flight crews with guidance pertaining to safe terrain and obstacle avoidance. Consequently, comprehensive terrain and obstacles data sets of higher accuracy in the aerodrome vicinity may provide increased protection against approach and landing accidents and CFIT.

3.1.3 EN-ROUTE 'DRIFT-DOWN' PROCEDURES

As aviation moves forward to use Area Navigation (RNAV), with point-to-point direct routings predicated on navigation systems, more aircraft will likely fly off-airways. Many of these routes will overfly mountainous terrain (for example, over the Alps), or areas such as the Greenland Ice Cap.

Occasional re-routings take commercial aircraft on routes where a one-engine inoperative "drift-down" may require the aircraft to descend over mountainous terrain. In some situations, the one-engine inoperative cruise flight may be performance limited such that the aircraft is unable to sustain flight above Minimum Obstacle Clearance Altitude (MOCA). Consequently, without any outside help, pilots need to quickly and accurately calculate their best "escape" route to avoid high terrain and/or to maintain the necessary terrain and obstacle clearance. Therefore, this operational application has both a safety as well as an operational component.

Note: Although the requirements related to these procedures are provided in ICAO Annex 6 '*Operations of Aircraft'* - Part I, there is no association with the name "drift-down" as indicated in the Annex 15, Chapter 10, paragraph 10.1.

3.1.4 EN-ROUTE EMERGENCY LANDING LOCATION SELECTION

During an in-flight emergency, especially in general aviation operations, selection of an acceptable emergency landing site can often mean the difference between an aircraft sustaining only minor or no damage, versus suffering catastrophic damage. The risks are great when an aircraft must land immediately for any reason when flying at night or over unfamiliar territory. Under such circumstances, a high resolution, digital image, containing vegetation and cultural features, overlaid onto a terrain and obstacle database could assist pilots in identifying the safest location for a forced, emergency landing.

3.1.5 AERONAUTICAL CHART PRODUCTION

For pilots, a graphical portrayal of all aeronautical, cultural and topographic information generally specified for all type of charts by Annex 4 '*Aeronautical Charts*', is essential to safe and efficient navigation. Currently, this graphical portrayal is mostly provided to flight crews by way of paper charts. Alternatively, chart images can be portrayed on electronic displays of a flight deck. Electronic chart displays or electronic data-driven charts distributed via digital media or world-wide web connectivity respectively are the most appropriate solutions to enable flight crews to execute, in a convenient and timely manner, route planning, route monitoring and navigation.

Consequently, the usage of terrain and obstacle dataset satisfying Area 1 numerical requirements for generating the topographic layer (including possible contour generation capability) will significantly enhance the chart display for following ICAO Annex 4 type of charts: En-route Chart, Area Chart, Aeronautical Chart 1: 500000, Aeronautical Navigation Chart – Small Scale, Plotting Chart and Radar Minimum Altitude Chart.

3.2 eTOD AREA 4 APPLICATIONS

The Annex 15 definition for Area 4 terrain intents to support the high demanding operational requirements (flare profile, rate of descent, etc) for CAT II/III approaches in terms of characteristics of the pre-threshold terrain areas. The Precision Approach Terrain Chart (PATC) is the current graphical depiction mean by which State authorities provide to operators information necessary to perform height determination during precision approaches. The area covered by PATC matches exactly eTOD Area 4, however Annex 4 requires that within PATC area all elevations (terrain and objects) that differ with more than 3m (10ft) from the runway centreline profile shall be indicated.

Note: Although Annex 14 '*Aerodrome Design and Operations*' – Vol. I recommends establishment of a Radio Altimeter Operating area located in the pre-threshold area of a precision approach runway in order to accommodate aeroplanes making auto-coupled approaches and automatic landings, the length of the area i.e. at least 300m is not matching Area 4 longitudinal profile of 900m.

4. JEPPESEN PERSPECTIVE TOWARDS ICAO eTOD BENEFITS

4.1 JEPPESEN AS eTOD USER

For several years, Jeppesen has been doing considerable research and development work on collection, management, systems interfaces and display of terrain and obstacle information. Starting with the basic terrain data provided by the Shuttle Radar Topography Mission (SRTM), Jeppesen has been significantly augmented the quality of the SRTM datasets by applying sound methods, intelligent mathematical algorithms as well as other datasets with very high accuracy. The final result was the generation of a worldwide terrain envelopes databases with designated confidence levels of 10^{-3} (routine), 10^{-5} (essential) and 10^{-8} (critical) – called TerrainScape Level 1, 2 and 3 respectively.

Furthermore, Jeppesen efforts have been focused on creation of a single-source geo-spatial data repository of terrain, terrain high-points and man-made obstacles in order to ensure that all chart images (En-route High and/or Low, Terminal and VFR/GPS 1:500000 charts) utilize a single common terrain source of the highest quality with known quality characteristics. In parallel, we are concentrating our development efforts on the data that air-framers and aircraft operators require to support new on-board systems designed to enhance situational awareness in the air and on the airport surfaces e.g. data-driven electronic charts, Airport Mapping (AMDB), Electronic Flight Bag (EFB), Airspace and Procedure Design, Opsdata analysis, TAWS/MSAW & Flight Simulation (Terrain + Navdata ARINC 424), Synthetic Vision System (SVS) displays, etc.

Practically, our evolving navigation applications where eTOD information is an important product component will continue to fully support the end state of the ICAO Global ATM concept.

4.2 JEPPESEN'S AREA 1 TERRAIN AND OBSTACLE DATA PROGRAM

Jeppesen recognizes that the terrain and obstacle requirements of ICAO Annex 15, Chapter 10 challenge many Civil Aviation Authorities (CAA) and Air Navigation Service Providers (ANSP) around the world. Also, Jeppesen understands that certain States may not have processes established to deliver eTOD information to other users or may wish to outsource this responsibility.

Therefore, we have established processes, in cooperation with States that contract with Jeppesen, to maintain a State's Area 1 terrain and/or obstacle database and deliver it as required. It should be noted that our Terrain Area 1 data model has resolved the issues in relation to cross-border harmonisation as we have consistently applied same DO-200A/ED-76A quality-driven processes.

Finally, it can be mentioned that Jeppesen eTOD service for CAAs and ANSPs offers the possibility for States to notify compliance with Chapter 10 in its AIP (see also reference in GEN 1.7 '*Differences from ICAO SARPS'*).

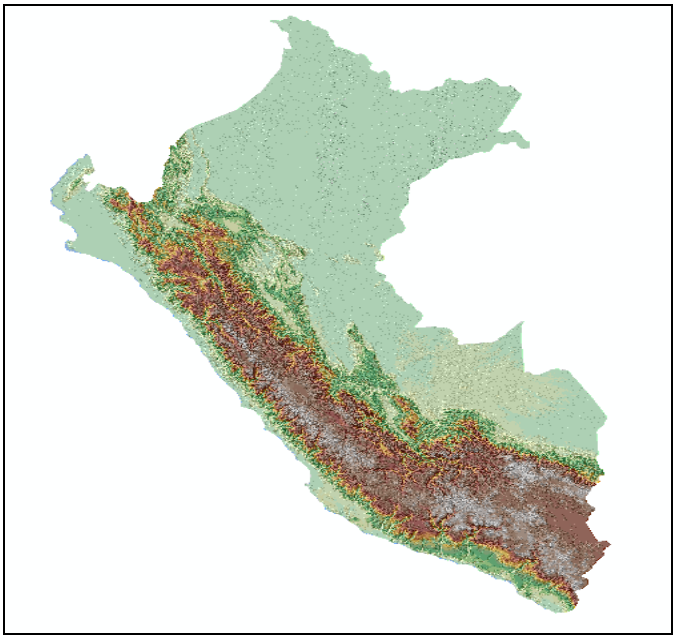
APÉNDICE / APPENDIX F

(disponible solamente en inglés)

ASTER GDEM TERRAIN DATA SUITABILITY TO FULFILL ICAO MEMBER STATES' ANNEX 15, CHAPTER 10 AVIATION REQUIREMENTS

(Presented by Jeppesen)

ASTER GDEM
Terrain Data
Whitepaper



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Introduction:

This report is provided in response to an inquiry for information concerning ASTER GDEM terrain data suitability to fulfill ICAO Member States' Annex 15, Chapter 10 aviation requirements. A CAA representative during the SAM/IG-5 in Lima Peru on 10-14 May 2010 have proposed using the ASTER GDEM terrain data as delivered by NASA to satisfy ICAO Annex 15, Chapter 10 quality specifications for Area 1. This report uses research performed by Jeppesen, NGA and NASA to illustrate that the ASTER GDEM Version 1.0 dataset delivered by NASA as being unsuitable for this purpose. Some of the information provided in this report specifically address the ASTER GDEM data for Peru with general quality portions of the report gleaned from research papers analyzing the entire ASTER GDEM dataset that were published by NGA and NASA. For a more in depth review of the ASTER GDEM analysis see the research papers by NGA and NASA referenced at the end of this report.

Jeppesen's Interest in ASTER GDEM Dataset:

During 2009 NASA released a new world wide 1 arc-second (30 meter) terrain model called ASTER GDEM. Jeppesen acquired this dataset in late 2009 and has been reviewing the terrain data for utilization in our Jeppesen Terrain Database as an SRTM void area fill source to replace the lower quality terrain data utilized for void filling in version 1.0 of Jeppesen's Terrain Database. The following report provides ASTER GDEM background and analysis results.

ASTER Project Mission:

ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) is a high efficiency optical sensor which covers a wide spectral region from the visible to the thermal infrared by 14 spectral bands. ASTER is being used to obtain detailed maps of land surface temperature, reflectance and elevation. ASTER was launched from Vandenberg Air Force Base in California, USA in 1999 aboard the Terra satellite.

ASTER GDEM Government Source:

The new global digital elevation model, ASTER GDEM, was produced by the Ministry of Economy, Trade and Industry (METI) of Japan and the United States National Aeronautics and Space Administration (NASA) from optical stereo data acquired by the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) satellite instrument. The ASTER Global DEM (GDEM) was released to the public on June 29, 2009.

Physical Configuration of Terra/ASTER Satellite:

The ASTER instrument includes three visible and near-infrared (VNIR) bands with a spatial resolution of 15 meters (m), six short-wave-infrared (SWIR) bands with a spatial resolution of 30m, and five thermal infrared (TIR) bands that have a spatial resolution of 90 m. VNIR Band3 also is acquired using a backward-looking telescope that provides along-track stereo coverage from which high-quality digital elevation models (DEMs) are generated as one of a suite of ASTER data products.

ASTER GDEM Production Method:

All the existing historical ASTER scenes from 1999-2008 were screened for cloud problems, correlation problems, and outliers based on comparison with a reference DEM or the average of the stacked scenes for each pixel. The data used to produce the GDEM are from the VNIR Band 3N (0.76-0.86 micron wavelengths). The methodology involved automated processing of the ASTER archive collected that included 1,264,118 individual scene-based ASTER DEM's, automated cloud masking to remove cloudy pixels, stacking all scene-based DEM's, removing residual bad values and outliers, averaging selected data to create final pixel values, and then correcting residual anomalies before partitioning the data into 1x 1 degree tiles.

Delivery Format of ASTER GDEM Terrain Data:

The ASTER GDEM is provided in GEOTIFF format with latitude/longitude decimal degree WGS-84 coordinates, elevations at 1 arc-second (30m) post spacing and the EGM-96 GEOID used as the vertical datum with elevations provided in meters.

Distribution of ASTER GDEM Terrain Dataset:

The ASTER GDEM is being distributed by METI and NASA through the Earth Remote Sensing Data Analysis Center and NASA Land Processes Distributed Archive Center. It is packaged in 1x1 degree tiles and covers land surfaces between 83N and 83S latitude.

Accuracy and Topographic Artifacts/Anomalies of the ASTER GDEM:

After reviewing the ASTER DEM in several selected geographic areas, NGA and NASA determined the accuracy characteristics of the dataset and observed some common and recurring artifacts/anomalies throughout the dataset. The observations have been grouped into the following categories. Each of these categories is covered in greater detail within this report under their own sections:

- Resolution
- Data Noise
- Mosaic artifacts & poorly fitting void-fill data
- Poor Water Body Delineation
    - Shoreline
    - Lakes and Streams
- Landform Artifacts
- Pits and Spikes

- Accuracy Determined from Ground Control Points (GCP)
- Affect of Slope on ASTER GDEM Accuracy:
- ASTER Comparison With Reference DEM's

Resolution:

With the release of the ASTER GDEM dataset the user community expected that the 30-meter post spacing of this dataset would yield visible resolutions similar to those of NGA's SRTM DTED2 (30-meter) dataset. Studies conducted by Japanese investigators as part of the ASTER GDEM validation measured the spatial detail of topographic resolution in the ASTER GDEM by comparing it with a series of degraded GSI 10m DEMs and calculated the standard deviations of the difference images. The plot of the standard deviations optimized at 3.8 arc seconds, meaning that the spatial detail resolvable by the ASTER GDEM, at least of the data tested, is slightly better than 120m, not the anticipated 30m resolution. Other testing groups have placed the resolution closer to 150m post spacing. A speaker at the ASPRS conference in San Antonio during Nov 2009 stated that the ASTER dataset was re-sampled to 30 meter post spacing from a coarser resolution to match the published elevation post spacing specification of 1 arc-second (30m).

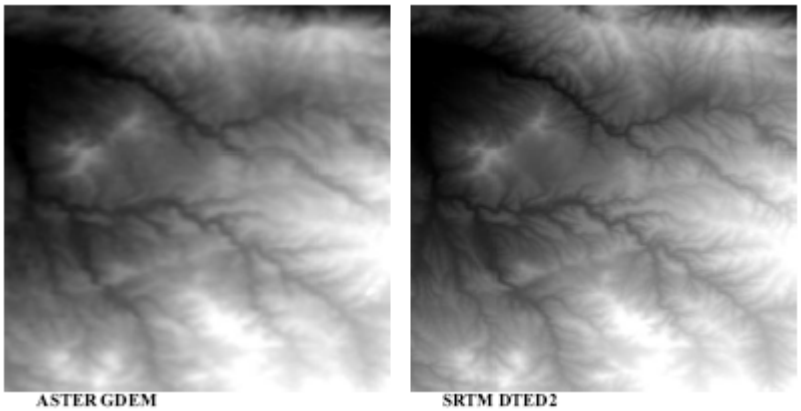


Figure 2 shows image resolution differences provided by NASA's ASTER Validation Team. Note that the ASTER GDEM image on the left is slightly fuzzier than the SRTM DTED2 (30m) image on the right. This indicates that even though the ASTER GDEM data has 30 meter post spacing like the SRTM DTED2 data its effective resolution is controlled by a coarser elevation post spacing governed by the master ASTER GDEM dataset. As a result of this the ASTER GDEM dataset does not satisfy Annex 15 Chapter 10's requirement for an effective resolution of 90 meters (3 arc-second) for Area 1.

Data Noise:

Figure 3 below shows the ASTER terrain surface appearing rougher (left image) than the same area shown from the Jeppesen SRTM TerrainScape Base layer (TS0) terrain surface (right image) due to higher noise levels of ASTER acquisition that has not been filtered out during production processing.

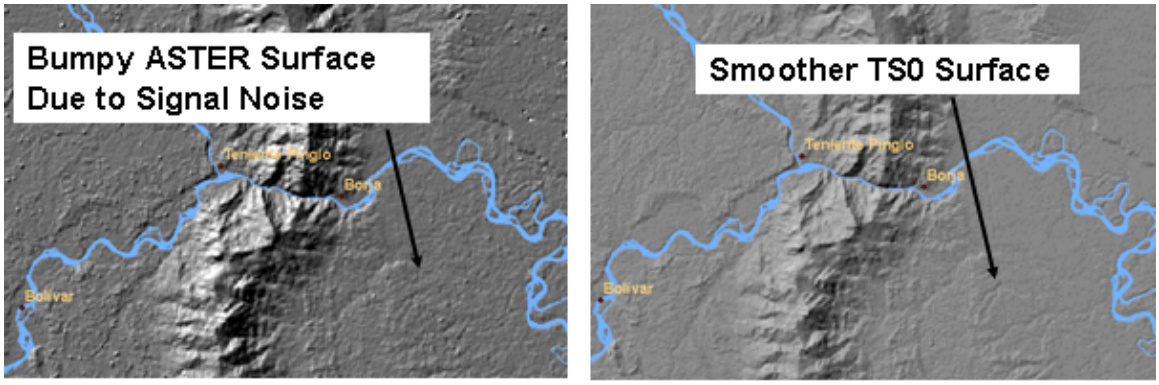


Figure 3 displays an area in Peru for both the ASTER GDEM and TS0 terrain datasets. While Annex 15, Chapter 10 does not address the 'noisy data' issue specifically it may lead to inappropriate aviation decisions concerning its use without further processing to remove the bumpiness. Figure 3 also shows water body and population center point files for illustration purposes.

Mosaic Artifacts:

The ASTER GDEM dataset was compiled from over a million individual ASTER images collected during the TERRA satellite's mission. In some cases where mosaic operations took place matching individual ASTER scenes some seam lines can be seen where individual images have vertical alignment issues. The vertical alignment between mosaic scenes can be identified in the image below as a persistent line crossing the image.

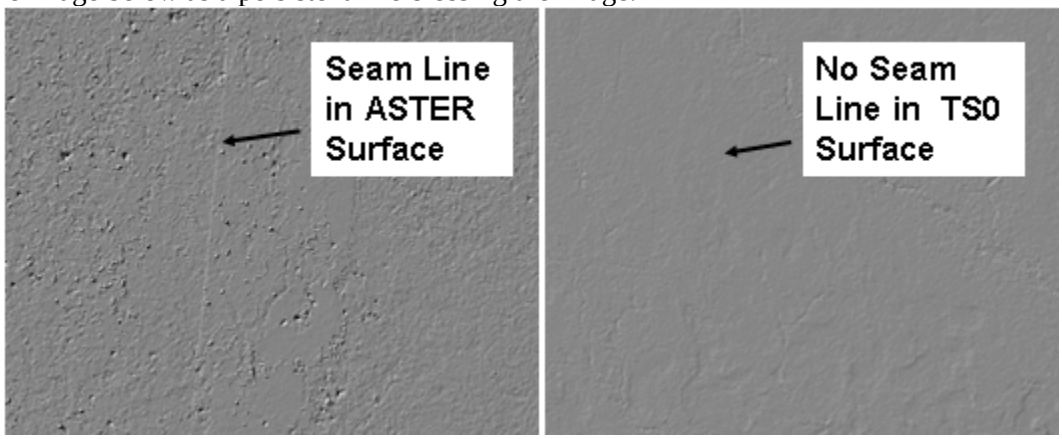


Figure 4's left image shows a seam line from the ASTER GDEM in Peru. The NASA Validation Team quantified these step anomalies as being 10 meters high typically. The same area shown in the right image with TS0 data has a seamless image. The ASTER image also shows numerous pits/wells across the area. While Annex 15, Chapter 10 does not address mosaic seam line or pits/well issues specifically it may lead to inappropriate aviation decisions concerning ASTER GDEM's use without further processing.

Poor Coastline Definition and Water Body Identification:

Figure 5 from the NGA shows an area in Canada where the ASTER GDEM indicates false islands and false land form extensions. This is due to the data processing plan for the ASTER

GDEM not including processing for water body delineation and elevation adjustments. As a result some areas have shorelines incorrectly shown with several false islands depicted and inland water bodies generally undefined as seen in the left side image of Figure 5.

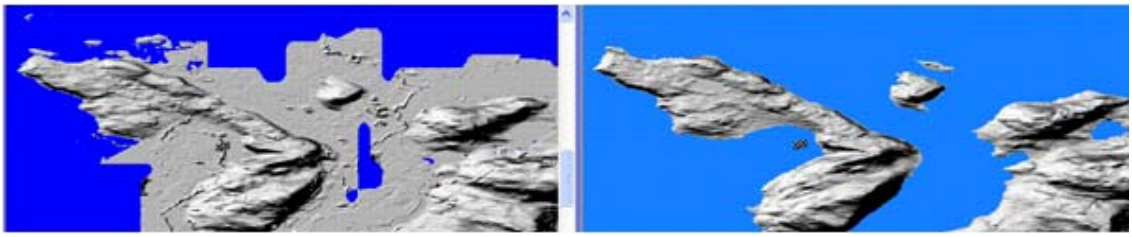


Figure 5 was provided by the NGA ASTER GDEM review team and shows a shoreline example in Canada. A review of the Peru dataset did not find a situation as extreme as the one shown by the NGA example but some lesser examples were found where the exact position of the shoreline is difficult to identify as shown in the left image of Figure 6 below.

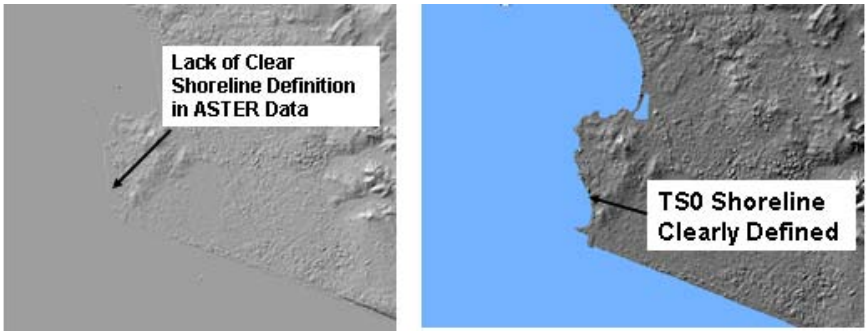


Figure 6 shows an area along Peru's coastline (left image) that illustrates the lack of processing in the ASTER GDEM data to clearly delineate water boundaries. The TS0 example (right image) shows a clearly defined shoreline that has been properly leveled in the TS0 terrain model.

Figure 7 below shows a lake and stream in Peru where the ASTER GDEM dataset (upper left image) incorrectly portrays the extent and non-leveled elevations of the water bodies.

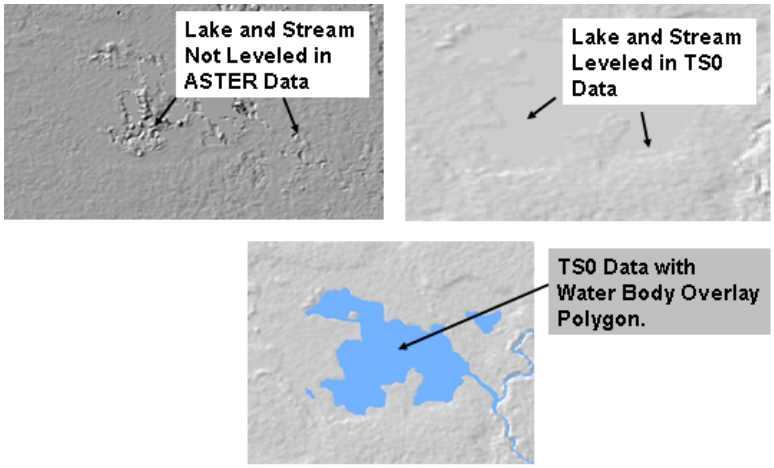
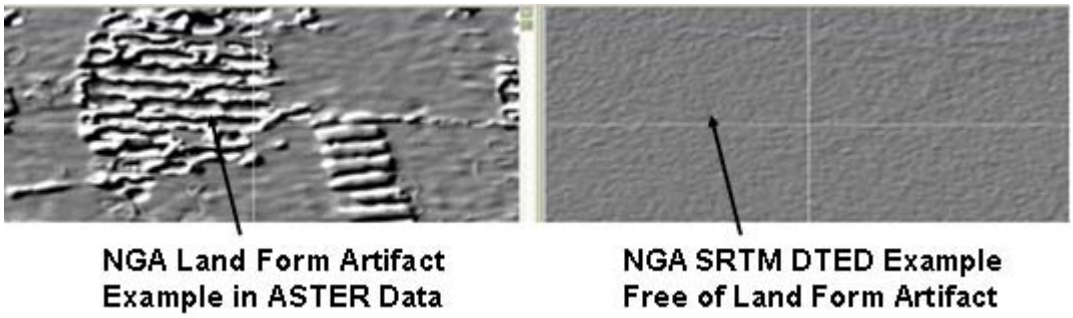


Figure 7 also shows the same area from the TS0 data in the upper right image where water body processing has leveled the lake and stream for clear delineation of these features in the terrain model. The lower image shows the extent of the water bodies with the help of a water body overlay file from DeLorme.

Landform Artifacts:

Figure 8 from NGA illustrates a processing anomaly that occurs in the ASTER GDEM dataset.

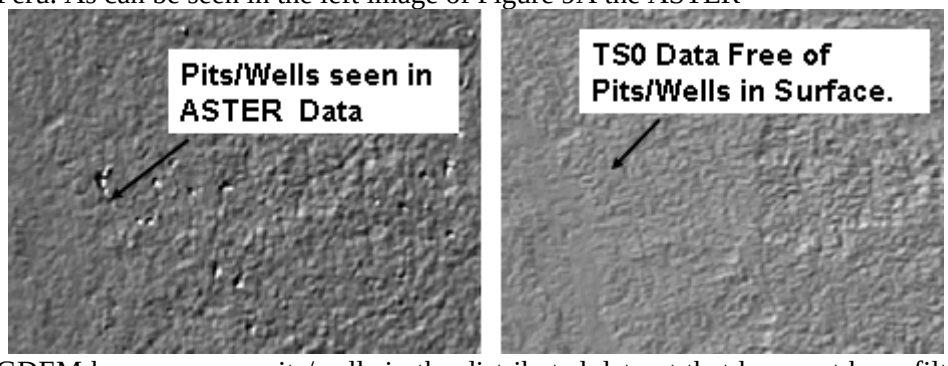


This image shows the processing anomaly occurring in Bosnia in the left image and the same area in NGA's SRTM DTED2 (30m) dataset on the right without the processing artifacts. Jeppesen's TS0 data (90m) will show a similar artifact free surface as the NGA SRTM DTED2 (30m) data since it was derived from NGA's SRTM DTED2 (30m) data. While a review of the ASTER GDEM area covering Peru did not identify this type of obvious anomaly it remains that landform artifacts may be present on a smaller scale in the delivered dataset for Peru.

Pits/Wells and Spikes:

Pits/Wells:

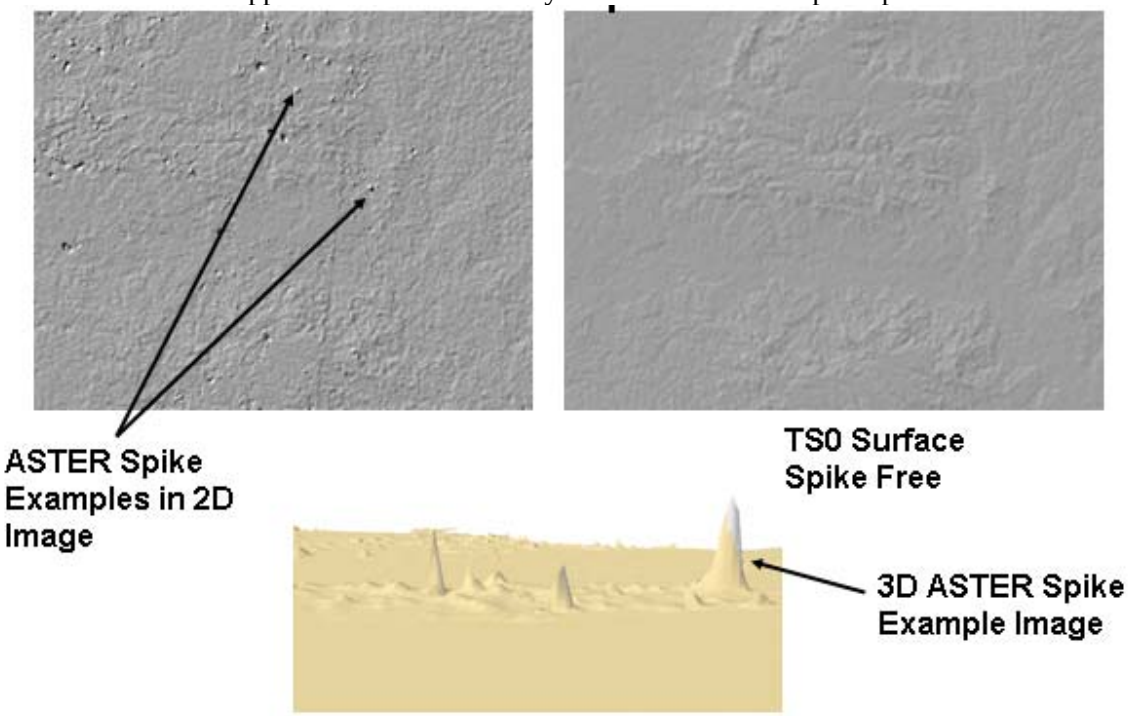
Figure 9A below shows a population of pits/wells within the ASTER GDEM dataset for Peru. As can be seen in the left image of Figure 9A the ASTER



GDEM has numerous pits/wells in the distributed dataset that have not been filtered out. These types of features are common in remotely sensed terrain data and are normally filtered out prior to delivery. The removal of pits/wells was not included in the final processing of the ASTER GDEM dataset. The TS0 image on the right of the same area shows that TS0 terrain surface is smoother and free of pits and wells.

Spikes:

Figure 9B below shows a population of spikes within the ASTER GDEM dataset for Peru. From Jeppesen and NASA's analysis shows numerous spikes present



in the delivered ASTER GDEM dataset for Peru. The spikes range in height to approximately 200 meters above the surrounding surface. Normally these types of anomalies are filtered out but in the ASTER GDEM they remain. The ASTER GDEM team did not incorporate spike removal in their processing flow. The TS0 surface shown on the right in Figure 9B is free from spikes. The lower inset of Figure 9B shows an area of Peru's ASTER GDEM dataset modeled in 3D for easier visualization of spikes present within the dataset.

Accuracy Determined from DEM and Ground Control Points (GCPs):

NGA and NASA performed extensive tests of the ASTER GDEM dataset to determine its' accuracy. Globally the ASTER GDEM data products are produced with 30m elevation post spacing and have vertical accuracies generally ranging between 10 – 30 meters at the 90% confidence level as determined from a global population of Ground Control Points (GCP) provided by NGA. There is a variation in vertical accuracy by region that is illustrated in Table 1 from NGA's report. The horizontal accuracy for ASTER GDEM varies 3 – 50 meters depending upon the reference source used as shown in Table 1.

Geographic Area	No. of Cells	SW Corner Coords.	NE Corner Coords.	Approximate Elevation (a) (m)		Source (b)	Absolute Vertical Error Range (m) (90% L.E.) (c)		Absolute Horizontal Error Range (m) (90% C.E.) (c)	
				Min	Max		Min	Max	Min	Max
Afghanistan-1	8	N32 E065	N34 E069	920	4800	SRTM DTED2	5	10	9	9
						IFSAR DEM	7	7	3	3
Afghanistan-2	9	N29 E064	N32 E067	640	3300	SRTM DTED2	4	5	9	9
						Photo. DTED2	4	7	23	23
Argentina	25	S41 W071	S36 W066	50	4700	SRTM DTED2	5	6	9	9
Australia	25	S16 E130	S11 E135	-110	560	SRTM DTED2	4	6	9	9
Bolivia	4	S20 W068	S18 W066	2530	5460	SRTM DTED2	6	8	9	9
Bosnia	15	N42 E017	N45 E022	-60	2680	SRTM DTED2	4	7	9	9
						Photo. DTED2	10	38	4	50
Canada	6	N72 W084	N73W078	0	1510	Photo. DTED2	18	18	23	23
China-1	25	N31 E084	N36 E089	4380	6760	SRTM DTED2	4	6	9	9
China-2	25	N36 E108	N41 E113	400	2810	SRTM DTED2	4	8	9	9
Iraq	16	N33 E042	N37 E046	0	3600	SRTM DTED2	4	8	12	12
						Photo. DTED2	8	13	7	23
Kazakhstan	25	N49 E072	N54 E077	-10	1530	SRTM DTED2	3	3	9	9
Korea	12	N37 E125	N41 E128	-120	2520	SRTM DTED2	5	8	9	9
						Photo. DTED2	2	34	3	27
Libya	4	N23 E021	N25 E023	240	690	SRTM DTED2	6	7	12	12
Nigeria	25	N09 E009	N14 E14	110	1760	SRTM DTED2	4	5	12	12
Philippines	2	N07 E125	N09 E126	-40	2670	SRTM DTED2	6	7	9	9
Russia-1	2	N75 E064	N77 E065	0	990	Photo. DTED2	5	8	9	9
Russia-2	1	N79 E096	N80 E097	0	710	Photo. DTED2	6	6	23	23
Russia-3	20	N63 E042	N67 E047	0	270	Carto. DTED2	17	17	27	27
Thailand	10	N14 E099	N19 E101	-40	2120	SRTM DTED2	4	6	9	9
U.S.A.-Alaska	25	N60 W152	N65 W147	0	6180	Carto. DTED2	16	33	23	32

(a) Source: SRTM DTED® 2.
(b) Photogrammetrically-derived DTED®; Cartographically-derived DTED®; Interferometric Synthetic Aperture Radar (IFSAR) DEM.
(c) L.E. is linear error; C.E. is circular error.

Table 1 – Table shows accuracy values for GCP and DEM derived values.

Table 1 illustrates that vertical and horizontal accuracy varies geographically. From the table the horizontal accuracy values fall within the Annex 15 Chapter 10 specification of 50 meters CE at 90% confidence level. For vertical accuracy ASTER GDEM compiles in most areas with Annex 15 Chapter 10 specification of 30 meters LE at 90 % confidence exceeding the specification in a few of the countries tested.

Effect of Slope on ASTER GDEM Accuracy:

Accuracy analysis that incorporates slope into the accuracy computation shows a degradation of vertical accuracy with increasing slope. The following image provided by NASA shows when slope increases (along horizontal axis of the graph) the elevation error (along vertical axis of graph) also increases.

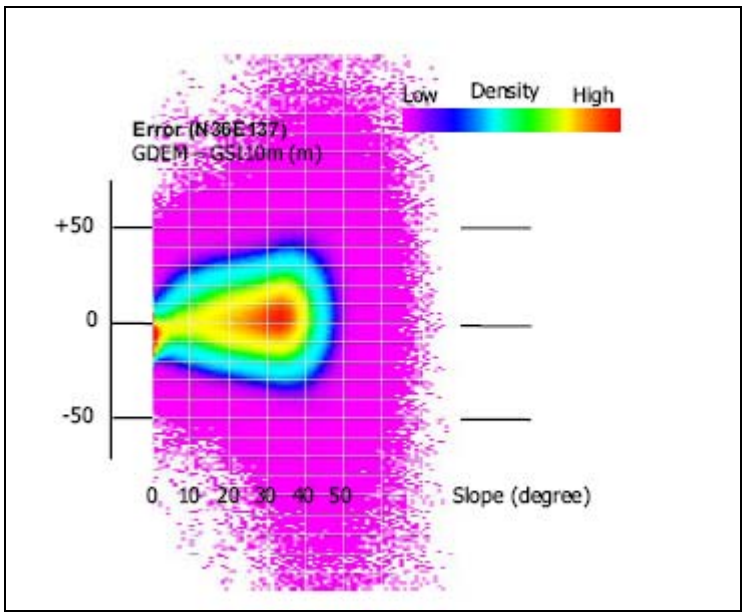


Figure 10 From NASA's ASTER GDEM Validation Team report dated June 2009
The impact of slope affected vertical accuracy should be evaluated in the mountainous topography of Peru before using this dataset for aviation purposes.

ASTER GDEM Comparison with Reference DEMS:

NASA and NGA performed reviews of the ASTER GDEM dataset against multiple reference DEM's with the SRTM DTED2 (30m) dataset being one of them. A major finding found that in almost every geographic area the ASTER GDEM elevations are lower than the reference NGA SRTM DTED2 DEM elevations. The elevation differences typically range from 5 meters to approximately 20 meters lower than elevations of SRTM data.

Since Jeppesen's TS0 terrain data was derived from NGA's SRTM DTED2 terrain model the same findings have been found in a handful of sample locations in Peru as shown by the following Table 2. Some of the difference values between these datasets exceed the general findings of NGA in the mountainous region of Peru used for this sampling.

ASTER Elev(ft)	**TS0 Elev(ft) Values(ft)**	**Difference**
3625	3655	Aster 30ft below TS0
2431	2473	Aster 42ft below TS0
11955	11936	Aster 19ft below TS0
12661	12694	Aster 33ft below TS0
12641	12717	Aster 76ft below TS0

Table 2 from Jeppesen review of TS0 terrain dataset.

ASTER GDEM Data Classification:

After careful review and consideration of the results and findings presented in the Validation Summary Report, METI and NASA decided to release the ASTER GDEM for public use and further evaluation. METI and NASA acknowledge that Version 1 of the ASTER GDEM should be viewed as **"experimental"** or **"research grade".** With a classification of "**research grade"** Jeppesen's use of ASTER GDEM will be on an as needed basis after careful consideration and extensive post processing to remove many of the artifact findings illustrated in this report.

Conclusions:

From testing performed by NGA, NASA and Jeppesen the overall quality of the ASTER GDEM is less than Jeppesen's TS0 terrain database. ASTER GDEM does not satisfy Annex 15, Chapter 10 Area 1's post spacing of 90 meters even though the published specification would indicate that it would exceed the requirement. ASTER GDEM also fails to meet vertical accuracy requirements of Annex 15, Chapter 10 as seen in Table 1 for some geographic areas. Other qualitative issues reported in this whitepaper remove the ASTER GDEM dataset from consideration as an acceptable replacement for the SRTM DTED1 (90m) dataset without extensive additional processing.

References:

ASTER Global DEM Validation Summary Report, METI/ERSDAC, NASA/LPDAAC and USGS/EROS, June 2009.

Evaluation of the New ASTER Global Digital Elevation Model, National Geospatial-Intelligence Agency, James A. Slater and others, July 29, 2009.

Agenda Item 3: Implementation of performance-based navigation (PBN) in the SAM Region

En-route (RNAV5) PBN action plan

3.1 The meeting recalled that the SAM/IG Meetings have been reviewing, as a matter of routine, the PBN Implementation Project - En-route short term (RNAV-5) PBN Action Plan for the SAM Region, and the associated En-route (RNAV-5) PBN Action Plan. They introduced the changes they deemed appropriate, identified the responsible parties and the start/end dates for the different activities, and adopted the action plan as guidance material to be followed by the States.

3.2 As a follow-up of the status of implementation of the tasks assigned to each one of the responsible parties designated by the Implementation Group, the meeting again assessed the PBN action plan. The meeting, in reviewing the action plan, made the following comments on the valid tasks:

Task 1.3 Analyse aircraft fleet navigation capacity

3.3 According to the information gathered during the SAM/IG/4 Meeting, 95% of the SAM fleet would be eligible for RNAV5 approval. According to Conclusion SAM/IG/4-3, the States must continue making efforts to complete the corresponding database.

Task 1.4 Analyse ground communication, navigation (VOR, DME) and surveillance means to meet the navigation specifications and the navigation reversal mode

3.4 This task should be completed through a workshop, to be held under the auspices of Regional Project RLA/06/901, and through the hiring of two experts for a two-week period, as it was done for the safety assessment. The tentative date would be March 2011, keeping in mind the need to use such results for the implementation of Task 6.6 and for its assessment at the SAM/IG/7 meeting.

Task 2.1 Conduct the safety assessment applying a qualitative methodology using the SMS

3.5 During the SAMIG meetings, the Implementation Group determined that the qualitative methodology shown in ICAO Doc 9859, Safety Management Manual (SMM), would be applied, using a “safety case”.

3.6 In order to carry out this task, the ICAO South American (SAM) Regional Office, with the support of Regional Project RLA/06/901, scheduled a workshop to assess the risks of the systems prior to the implementation of RNAV 5. It also contemplated the participation of an expert for a period of three weeks to assist the Secretariat in the drafting of the safety case. This responsibility was assigned to Mr. Claudio Pandolfi from the Chilean CAD.

3.7 This workshop allowed for the participation of experts who identified the hazards that might affect or hinder implementation, assessed the consequences in terms of likelihood and severity, as well as the tolerability of the operational risks, and defined the mitigation measures required to enhance safety through the application of the risk management methodology contained in the Safety Management Manual (Doc. 9859).

3.8 The study concluded that the level of risk is acceptable for the implementation of RNAV5 in continental airspace of the SAM Region. On the other hand, its implementation is expected to enhance safety since it requires a greater lateral navigation precision, which will also permit an orderly transition for the introduction of other navigation specifications and the application of parallel route systems where necessary. Finally, recommendations are made for various organisations of the Region and for aeronautical authorities, operators and ATS systems of the SAM Region. In summary, the implementation of RNAV 5 in the continental area of the SAM Region is feasible as shown in this study, based on risk management and applying the defences defined by this safety study. In this connection, the meeting approved the following conclusion:

Conclusion SAM/IG/6-2 Application of subsequent actions to reduce the RNAV5 safety plan risk and the resulting risk rate

That States, ATS providers and aircraft users take the necessary measures to apply further action to reduce the RNAV5 safety plan risk and the resulting risk rate, as shown in Appendix 1 to Chapter 4 of the safety plan for RNAV5 implementation in the SAM Region, shown in **Appendix I** to this part of the report.

Task 3.1 Coordinate the planning and implementation needs with air navigation service providers, regulatory bodies, aircraft operators and military authorities

3.9 It is expected that States permanently coordinate the implementation needs with air navigation service providers, users, aircraft operators and military authorities.

Task 5.2 Publish national regulations for the implementation of the RNAV5 specification

3.10 The meeting verified that 3 States of the Region had already published the regulations; 9 States informed that this task was being executed; and there was no information from 2 States. IATA informed the meeting that they had done the follow-up on this matter and had noted that several States had not published the regulations; therefore, it had been difficult to begin the approval process.

Task 5.3 Begin the approval of aircraft and operators

3.11 The meeting expressed its concern in view of the scarce number of operators that had requested approval. It also felt that operators should be encouraged to begin this process. According to the information received, 1 State had begun the approval process; 3 States had not done so yet; and 3 were in the process of execution. There was no information available about 5 States. For 2 States it is not applicable.

Task 5.4 Establish and keep up to date a registry of approved aircraft and operators

3.12 Within the framework of performance-based navigation (PBN), the SAM Implementation Group (SAMIG) has decided to establish a database of aircraft and operator RNAV5 approvals and other navigation specifications, under the responsibility of the CAR/SAM Regional Monitoring Agency (CARSAMMA).

3.13 In order to establish that database, the Meeting felt that it was necessary to prepare the corresponding forms for approval and cancelation of approvals. To that end, the Secretariat was requested to develop and distribute, together with CARSAMMA and the support of the Regional Project RLA/06/901, if applicable, the necessary forms to the SAM States, in order to develop and keep updated the cited database.

3.14 CARSAMMA, together with the Secretariat, has prepared the model forms for registration of the PBN approval and approval cancellation status of aircraft and operators.

3.15 These forms have been entitled CMA F5 and CMA F6, and, once completed by the certifying authorities, either for the approval or cancellation process, as applicable, must be sent to the CAR/SAM Regional Monitoring Agency (CARSAMMA), to constitute the only regional database on PBN approvals.

3.16 This database (simplified version) will be available through the Internet to all interested parties, and the form, in its full version, will be sent on a monthly basis to other agencies (RMAs) for information exchange purposes.

3.17 The forms for performance-based navigation (PBN) approval and cancellation of approval of aircraft and operators were submitted to the aeronautical authorities through letter LT 11/30.2-SA455 dated 8 July 2010. In this connection, the following conclusion was formulated:

Conclusion SAM/IG/6-3 Forms CMA F5 and CMS F6

That SAM States take pertinent action in order to apply forms CMA F5 and CMA F6, attached as **Appendices A and B** to this part of the report, and send them to CARSAMMA as soon as the PBN approval of aircraft and operators is established.

Task 6.5 Develop an AIP Supplement Model containing the applicable standards and procedures, including the corresponding in-flight contingencies

3.18 Another task of the PBN Implementation Project – short-term en-route operations in the SAM Region, refers to the development of an AIP Supplement/AIC Model, containing information on performance-based navigation (PBN), particularly that related to RNAV5.

3.19 In order to carry out this activity, Regional Project RLA/06/901 foresaw the participation of an expert for a two-week period, in order to assist the Secretariat in the development of the aforementioned document. The AIP Supplement/AIC revised by the SAM PBN Implementation Group, containing the specific standards and operational procedures for the application of RNAV5 application, is shown in **Appendix C** to this part of the report.

Task 6.6 Develop an amendment to the AIP/AIP Supplement corresponding to ENR 3.3, including limitations as regards applicable sensors and critical radio navigation aids in each route segment

3.20 The meeting noted that, according to Doc 8126 – Manual for aeronautical information services, shows in its Section ENR-3, Routes that air navigation routes (RNAV) should be included, and in view of this and in order to have a standard format for the publication of the corresponding information to be incorporated into section ENR 3.3 – RNAV Routes of the AIP, presents a model expected to be used by SAM States, and formulated the following conclusion:

Conclusion SAM/IG/6-4 ENR 3.3 – Table model of the AIPs

That SAM States, in publishing in their AIPs RNAV routes, use the ENR table model shown in **Appendix D** to this part of the report.

Task 6.9 Develop an amendment to the regional documentation, if necessary

3.21 Keeping in mind the complexity of this task, to be presented to the SAM/IG/7 Meeting, the Secretariat is requested to assess, at the Project RLA/06/901 forthcoming Regional Coordination Meeting, the planning of this task for the first quarter of 2011, with a view to develop an EN 3.3 model with the information of the work carried out in task 1.4.

3.22 In order to comply with this activity, Regional Project RLA/06/901 foresaw the participation of an expert for a two-week period, in order to assist the Secretariat in the development of the mentioned document.

3.23 The activities developed by the ATM Expert with regard to Performance-based navigation (Regional Project RLA/06/901 Immediate Objective N° 1 – Result 1.1), were focused in Amendment to Document 7030 – Regional Supplementary Procedures, in order to include eventual restrictions and special procedures for its application at a regional level with respect to RNAV5 and the list to be circulated among parties involved for its approval.

3.24 Among the activities carried out, the information available with regard to Doc 9613, SAM PBN Roadmap, and the action plan and the Reports of the SAM Implementation Meetings/Workshops (SAM/IG) particular procedures for regional application were revised and assessed and the AIC published by SAM States related to PBN were taken into account. The amendment to Doc 7030 – Regional Supplementary Procedures was developed with all the information obtained, and is shown in **Appendix E** to this part of the report.

3.25 Also, through a teleconference with experts of the Region, the initial draft amendment was evaluated and then, it was submitted to ICAO HQ, in order to verify that the proposed text was aligned with all the documentation of the organization. After revision by HQ, this amendment was circulated through letter LT 11/2.6-SA635 dated 27 September 2010, Subject: *Proposal for amendment to the ICAO Regional Supplementary Procedures (Serial No. SAM-S 10/01, Chapters 2, 4, 6 and 9*).

Task 8.2 Assess the percentage of RNAV5 approved operations (non-exclusionary airspace)

3.26 So as to enable finalization of this task during the SAM/IG/7, it will be necessary to hire an expert to make a comparison analysis between the data base of approval with the air traffic data collection between the period 1 to 15 July 2010. In view of this, the Secretariat is requested to evaluate the planning of this task at the Project RLA/06/901 Regional Coordination Meeting, for the first quarter of 2011.

Task 8.4 Publish trigger NOTAM

3.27 The list of tasks for RNAV5 implementation The List of Tasks for the Implementation of RNAV 5 in the SAM Region includes the issuance of a **trigger NOTAM** to confirm the date and time of RNAV 5 effectiveness in the corresponding FIRs.

3.28 The meeting analysed the proposed trigger NOTAM for RNAV5 presented by the Secretariat, and which should be published seven days before the foreseen implementation date.

3.29 The meeting, after making the necessary changes, concluded that the following text could be applied by SAM States:

In accordance with AIC #... and or AIP Supplement #...the application of RNAV 5 in RNAV routes in the continental airspace of (name) FIR XX shall commence at 0901 UTC -----.

Task 9.1 Develop a post-implementation monitoring programme for en-route operations

3.30 After the implementation of RNAV5, the SAM Region will enter into a pre-operational phase for a one-year period. At the end of this target date, in case the safety assessment is positive, it will be possible to move to an operational phase.

3.31 During this period, a post-implementation programme of operations must be established, with the main objective of assessing safety. The collection of information of this monitoring programme will be the basis to carry out the safety assessment of the same. Both the safety assessment as well as the performance as a whole must be executed on a permanent basis.

3.32 Taking into account the aforementioned, and in order to comply with this activity, Regional Project RLA/06/901 foresaw the participation of an expert for a two-week period, in order to assist the Secretariat in the development of the mentioned document.

3.33 The programme for post-implementation monitoring of RNAV en-route operations is necessary to check if the typical navigation precision demonstrated meets the required performance and to identify any failures in the navigation system. This is a similar data collection programme to assess the RVSM airspace in the Region.

3.34 This monitoring programme is made up by monthly reports that the ACCs of the Region must submit to the CARSAMMA. As in the vertical deviations, the reports prepared by the ACCs must be submitted to CARSAMMA before the 10th day of each month, even if no deviations exist, this information must be submitted to the regional monitoring agency.

3.35 At first it was considered to use one form for data collection, to include both RVSM as lateral navigation, merging both programmes. However, it was deemed pertinent to maintain two separate forms in order to facilitate collection and data analysis.

3.36 In view of the above, the meeting formulated the following conclusion:

Conclusion SAM/IG/6-5 Lateral navigation deviation reporting form

That SAM States take the corresponding action in order to use the monitoring programme and particularly lateral navigation deviation reporting form attached as **Appendix F** to this part of the report, and send it to CARSAMMA on the tenth day of each month.

3.37 The updated en-route PBN Action Plan (RNAV5) is shown in **Appendix G** to this part of the report.

Postponement of RNAV5 implementation date in the SAM Region

3.38 After reviewing the en-route PBN Action Plan (RNAV5), the meeting felt that there were still some tasks that had not been completed, and which were essential for such implementation. Taking into account that such tasks would require an effort by SAM States, the users, the ICAO SAM Office, and Regional Project RLA/06/901, the meeting decided to postpone the RNAV5 implementation date in the SAM Region for 22 September 2011.

3.39 The States, International Organisations, and airspace users have made a huge effort and considerable investments to implement RNAV5 as requested by GREPECAS pursuant to the PNB Roadmap and the corresponding Action Plan for the SAM Region, and some States expressed that they were ready for the implementation. Thus, civil aviation administrations, users, ATS providers and, in general, the ATM community are expected to report on the progress made in the assigned tasks for a timely completion of the Implementation Programme and to avoid the need for a new postponement.

3.40 Likewise, all parties involved must be aware that a delay in the implementation of the tasks for the implementation of RNAV5 might affect not only the implementation of the Programme itself, but also several investments already made. Therefore, SAM States and International Organisations must commit themselves and take the necessary measures to comply with the agreements reached with a view to a successful implementation of RNAV5.

3.41 In order to avoid a further postponement of the implementation date, the Meeting felt that it was absolutely necessary to establish a mechanism to follow up the activities of the RNAV5 PBN action plan. In this sense, the Meeting deemed it advisable to designate a coordinator to carry out such follow-up through the points of contact of the States, International Organisations and operators. Thus, all the parties concerned shall send the updated action plan to the coordinator on the 10th of each month, *via* e-mail, with a copy to the SAM Regional Office. The nominated coordinator was Mr. Julio Pereira (e-mail: **pln1@decea.gov.br**) was appointed as coordinator. Upon receiving the updated plans from the States, the coordinator will coordinate the holding, at least once a month, of a teleconference using the "go to meeting" tool of the SAM Regional Office.

Publication of an AIC/NOTAM announcing the postponement of the implementation date in the SAM Region

3.42 Taking into account that the SAM States have published the initial AIC announcing the implementation of RNAV 5 on 18 November 2010, it will be necessary to publish a new AIC or NOTAM informing about the postponement of this implementation date. In this respect, the Meeting formulated the following conclusion:

Conclusion SAM/IG/6-6 Publication of an AIC/NOTAM announcing the postponement of the RNAV5 implementation date in the SAM Region

That SAM States take the corresponding action in order to publish an AIC/NOTAM announcing the postponement of the RNAV5 implementation date in the SAM Region for 22 September 2011.

Status of implementation of the RNAV5 implementation activities in SAM States

3.43 This meeting of the Implementation Group has reviewed all the activities and tasks required for complying with the RNAV5 programme. **Appendix H** to this part of the report contains a Checklist of Tasks based on the information, conclusions and actions identified by the SAMIG.

APPENDIX A

THE INFORMATION CONTAINED IN THIS FORM MUST BE COINCIDENT WITH THE "SPECIFICATIONS RELATED TO OPERATIONS" THAT EACH AIRCRAFT SHOULD KEEP ONBOARD

CMA F5
REGISTRY OF PBN OPERATIONS AIRCRAFT APPROVAL

Report to CARSAMMA aircraft approved for PBN operations.

1. **Certifying Authority**:	

AIRCRAFT IDENTIFICATION			
2. State of Registry:	3. Name of Operator :		4. State of operator:
5. Registry number:	6. Aircraft Type:	7. Aircraft Serial:	8. Manufacturer's serial number:

PBN APPROVAL				
9. Approval		**10. Specification**	**11. Code**	**12. Date of approval**
Yes ❑	No ❑	RNAV 10 (RNP 10)		
Yes ❑	No ❑	RNAV 5		
Yes ❑	No ❑	RNAV 2		
Yes ❑	No ❑	RNAV 1		
Yes ❑	No ❑	RNP 4		
Yes ❑	No ❑	RNP 2		
Yes ❑	No ❑	RNP 1 basic		
Yes ❑	No ❑	RNP 1 advanced		
Yes ❑	No ❑	RNP APCH		
Yes ❑	No ❑	RNP AR APCH		
Yes ❑	No ❑	APV BARO VNAV		

13. ADDITIONAL INFORMATION

14. RESPONSIBLE CERTIFYING AUTHORITY	
15. Issuance Date:	

When completed, please return the report(s) to:
Agencia de Monitoreo para el Caribe y Sudamérica (CARSAMMA)
Assessoria de Segurança no Controle do Espaço Aéreo (ASEGCEA)
PRAÇA SENADOR SALGADO FILHO, S/N - CENTRO
20021-370 - RIO DE JANEIRO - RJ
Tel: (55-21)2101-6358 Fax: (55-21) 2101-6358
E-Mail: carsamma@decea.gov.br

INSTRUCTIONS TO COMPLETE THE CARSAMMA FORM CMA F5

1. Enter the identification of the Certifying authority.
2. Enter the two ICAO identification letters of the Registry State, as contained in ICAO Doc 7910.
3. Enter the three ICAO identification letters of the user, as contained in ICAO Doc 8585. For International General Aviation, enter "IGA". For military aircraft, enter "MIL". In Other situation, place an X in this field and write the name of the user/owner in the column 13, Additional Information.
4. Enter the ICAO State two letters the identification, as contained in ICAO Doc 7910.
5. Enter the aircraft registry.
6. Enter the ICAO designator, as contained in ICAO Doc 8643; i.e., for Airbus A320-211, enter A322; for Boeing B747-438, enter B744.
7. Enter the series of aircraft type or manufacturers designation; i.e., for Airbus A320-211 enter 211; for Boeing B747-438, enter 400 or 438.
8. Enter the Aircraft Manufacturer Serial Number.
9. Indicate status of operational clearance to operate as per each one of the specifications detailed in column 10.
10. Do not enter.
11. Enter the code that shall establish with which equipment was the operation authorized. This code shall be consequent with what was entered in **Table "A"** below.

    Note: RNP 1 Advanced and RNP 2 specifications are in progress, and no code has been associated yet for these specifications.
12. Enter the date in which aircraft was cleared.
13. Enter if you wish to make a relevant indication.
14. Signature of certifying authority.
15. Enter with the entering date; i.e., for 26 October 2010, enter 26/10/10.

TABLE A

Code	RNAV Navigation Specifications
A1	RNAV 10 (RNP 10)
B1	RNAV 5 – All sensors allowed
B2	RNAV 5 GNSS
B3	RNAV 5 DME/DME
B4	RNAV 5 VOR/DME
B5	RNAV 5 INS o IRS
B6	RNAV 5 LORAN C
C1	RNAV 2 – All sensors allowed
C2	RNAV 2 GNSS
C3	RNAV 2 DME/DME
C4	RNAV 2 DME/DME/IRU
D1	RNAV 1 – All sensors allowed
D2	RNAV 1 GNSS
D3	RNAV 1 DME/DME
D4	RNAV 1 DME/DME/IRU
Code	**RNP Navigation Specifications**
L1	RNP 4
O1	RNP 1 basic – All sensors allowed
O2	RNP 1 GNSS basic
O3	RNP 1 DME/DME basic
O4	RNP 1 DME/DME/IRU basic
S1	RNP APCH
S2	RNP APCH with BARO-VNAV
T1	RNP AR APCH with RF (special clearance required)
T2	RNP AR APCH without RF (special clearance required)

APPENDIX B

THE INFORMATION CONTAINED IN THIS FORM MUST BE COINCIDENT WITH THE CONTENT OF "SPECIFICATIOSN RELATED TO OPERATIONS" WHICH EACH AIRCRAFT MUST CARRY ON BOARD.

CMA F6

AIRCRAFT CANCELLATION REGISTRY FOR PBN OPERATIONS

1. When the Registry State originates the discharge of a user / aircraft approval for PBN operations in the CAR/SAM Regions, details as those shown below must be submitted to CARSAMMA through the most appropriate method.

2. The form must be entered and immediately submitted to CARSAMMA when the registry State originates the discharge of a user / aircraft approval for PBN operations.

1. CERTIFYING AUTHORITY:	

AIRCRAFT IDENTIFICATION			
2. State of Registry	3. Name of Operator:		4. State of Operator:
5. Registry number:	6. Aircraft Type:	7. Aircraft Serial :	8. Manufacturer´s Serial Number:

9. PBN APPROVAL CANCELLATION:	Type of approval cancelled:	Date:

10. REASON FOR APPROVAL CANCELLATION:	

11. REMARKS:	

12. RESPONSIBLE CERTIFYING AUTHORITY:	

13. ISSUANCE DATE:	

When completed, please send the report(s) to:
Agencia de Monitoreo del Caribe y Sudamérica (CARSAMMA)
Assessoria de Segurança no Controle do Espaço Aéreo (ASEGCEA)
PRAÇA SENADOR SALGADO FILHO, S/N - CENTRO
20021-370 - RIO DE JANEIRO - RJ
Tel: (55-21)2101-6358 Fax: (55-21) 2101-6358
E-Mail: carsamma@decea.gov.br

INSTRUCTIONS TO COMPLETE THE CARSAMMA FORM F6

2. If focal points may not transmit the information requested in Form CARSAMMA F6 through internet, they should send it through an e-mail to CARSAMMA. A CARSAMMA Form should be completed for each PBN-approved aircraft. The explanation below refers to the numbers written in the fields of CARSAMMA Form F6.

1. Enter the identification of the Certifying Authority.

2. Enter the two ICAO identification letters of the Registry State, as contained in ICAO Doc 7910.

3. Enter the three ICAO identification letters, as contained in Doc. 8585. For International General Aviation, enter "IGA". For military aircraft, enter "MIL". In any other situation, place an X in this field and write the name of the user / owner in column 11, "Remarks".

4. Enter the two ICAO letters of identification from the User's State, as contained in ICAO Doc. 7910.

5. Enter the aircraft registry.

6. Enter the ICAO designator, as contained in ICAO Doc. 8643; i.e., for Airbus A320-211, enter A322; for Boeing B747-438, enter B744.

7. Enter the aircraft type serial or manufacturer's designator; i.e., for Airbus A320-211, enter 211; for Boeing B747-438, enter 400 or 438.

8. Enter the aircraft Manufacturer's serial number.

9. Enter the cancelled approval type (code or name) and the Cancellation Date. Use one or more lines, is applicable.

10. Enter the reason for cancellation.

11. Enter Remarks, if appropriate.

12. Signature of the Certifying Authority.

13. Enter with the entering date; i.e., for 26 October 2010, enter 26/10/10.

APPENDIX C

Telephone:

Fax:

E-mail:

S T A T E

AERONAUTICAL INFORMATION

SERVICE

A I C

N° XX / XX

XX XX , 2010

IMPLEMENTATION OF RNAV 5 ROUTES IN CONTINENTAL AIRSPACE OF THE XXXX FIR

1.- PURPOSE

1.1 The purpose of this Aeronautical Information Circular (AIC) is to provide information about the implementation of RNAV 5 routes and operations in continental airspace of the XXXX FIR as of 18 November 2010, as a way to encourage the participation of stakeholders, specifically:

a) Aircraft operators;

b) Air traffic service providers;

c) Airspace management units;

1.2 The publication of this AIC does not preclude other dissemination activities, such as the development of supplements or amendments to the Aeronautical Information Publication (AIP – xxx) or the issuance of specific regulations concerning RNAV 5 implementation.

1.3 This circular supersedes AIC xx / 09 dated xx xx 2009.

2. INTRODUCTION

2.1 The continuous growth of civil aviation increases airspace demand, highlighting the need for an optimum use of available airspace. The enhanced operational efficiency resulting from the application of area navigation (RNAV) techniques has led to the development of navigation applications for all flight phases.

2.2 Navigation application specifications for specific routes or airspaces must be clearly defined in order to ensure that pilots and air traffic controllers (ATCs) are aware of the capabilities of the aircraft RNAV system in order to determine that the performance of the aircraft system is appropriate for airspace requirements.

2.3 RNAV systems have evolved in a way similar to conventional ground-based routes and procedures, in which a specific RNAV system was identified and performance assessed through analysis and in-flight inspection. However, airspace and obstacle clearance criteria were developed based on the performance of the available equipment, even getting to the point of identifying certain equipment models to be used in a given airspace.

2.4 Consequently, *prescriptive* requirement specifications were established, which, in turn, delayed the use of the new RNAV capabilities and generated higher maintenance and certification costs. Within this context, ICAO developed the Performance-Based Navigation (PBN) concept to avoid this type of prescriptive specifications and to enable the definition of aircraft equipment requirements, specifying primarily performance requirements.

2.5 The PBN concept specifies RNAV system performance requirements in terms of the accuracy, integrity, availability, continuity and functionality required for the operations proposed within the framework of a particular airspace concept. In summary, the PBN concept represents a change from system-based navigation to performance-based navigation.

RNAV 5 Standards

2.6 In January 1998, the European Aviation Safety Agency (EASA) published the acceptable means of compliance document 20-4 (AMC 20-4), which replaced transitional guidance material No. 2 (TGL No.2) issued by the former JAA. This AMC contains the acceptable means of compliance concerning airworthiness approval and operational criteria for the use of navigation systems in European airspace designated for basic area navigation operations (basic RNAV or BRNAV).

2.7 Likewise, the United States Federal Aviation Administration (FAA) replaced AC 90-96 of March 1998 with AC 90-96A issued in January 2005. This new circular provides guidance material on airworthiness and operational approval for operators of aircraft registered in the United States that operate in European airspace designated for basic area navigation (B-RNAV) and precision area navigation (P-RNAV).

2.8 The two current documents, AMC 20-4 and AC 90-96A, establish similar operational and functional requirements.

2.9 Within the context of the terminology adopted in the Manual on Performance-Based Navigation (PBN) of the International Civil Aviation Organization (ICAO), B-RNAV requirements are known as RNAV 5.

2.10 The specifications developed by EASA and the FAA are based on the capabilities of RNAV equipment introduced in the early 70's.

2.11 The RNAV 5 navigation specification has been developed by ICAO to be used in en-route operations within the coverage of ground- or space-based navigation aids, or within the capacity limitations of stand-alone aids, or a combination of both.

2.12 The RNAV 5 specification does not require pilot alerting in case of blunder navigation errors, nor two RNAV systems; therefore, the potential loss of RNAV capability requires that the aircraft be provided with an alternate source of navigation.

2.13 The level of performance selected for RNAV 5 operations permits the approval of a broad range of RNAV systems for these operations, including INS inertial systems, with a 2-hour limit after their last position alignment update conducted on the ground in the absence of an automatic aircraft position radio update function.

2.14 Although the RNAV 5 specification does not require in-flight performance control and alert function, the on-board equipment must maintain a lateral and longitudinal navigation precision of + / - 5 NM or more, 95% of the total flight time.

2.15 ICAO Manual on Performance-Based Navigation (Doc. 9613) establishes various navigation specifications that can be applied on a global basis. According to air traffic characteristics in the South American Region, RNAV 5 is the most appropriate for en-route operations, since approval requirements will allow most RNAV-equipped aircraft to meet approval requirements.

2.16 Accordingly, the purpose of RNAV 5 implementation is to optimise the use of aircraft RNAV capability as soon as possible, without the need for most aircraft to make significant changes on airborne equipment.

Benefits of RNAV 5

2.17 RNAV 5 operations provide potential advantages and benefits over conventional ground-based operations. RNAV 5 benefits cover aspects such as safety, ATC and air traffic flow management (ATFM), and economic and environmental considerations, amongst others.

2.18 Airspace capacity can be increased, not only en route but also in terminal areas, through the implementation of more direct routes that do not require flying over radio aids, and through the establishment of parallel routes to address traffic demand. Accordingly, airspace can be used more efficiently through a more flexible structuring of the ATS route network, the establishment of shorter and more direct routes, together with parallel or dual routes, routes designed so that aircraft overfly high-density terminal areas, and alternate or contingency routes to meet the needs of the user community.

2.19 The potential reduction in the tracking required by ATC to ensure that aircraft maintain the course or the assigned levels/altitudes, the reduction of controller/pilot RTF communications, and the increase in the time available for conflict resolution lead to a reduction in the workload of both the controller and the pilot.

2.20 From an economic point of view, shorter and more direct routes reduce fuel consumption, resulting in cost savings. Operators can take advantage of this reduction to increase payload. Furthermore, the implementation of RNAV 5 results in a more efficient management of ground-based radio aids and a better planning of infrastructure. RNAV 5 equipment permits a better maintenance of the course, which leads to reduced fuel consumption and pollution, resulting in a positive environmental impact.

3.- RELATED DOCUMENTS

- ICAO Annex 6 - Operation of Aircraft
- ICAO Document 9613 - Manual on Performance-Based Navigation (PBN)
- ICAO Document 7030 - Regional Supplementary Procedures
- Document 7300 - Convention on International Civil Aviation
- Advisory Circular SRVSOP CA 91-002 (or CAA equivalent)

4.- DEFINITIONS AND ABBREVIATIONS

For purposes of this circular, the definitions and abbreviations contained in ICAO Document 9613, Manual on required-based navigation (PBN), apply.

5.- SCOPE

5.1 RNAV 5 will be applied on all RNAV routes within the continental airspace of the xxx FIR, between flight levels FL xxx and FL xxx.

5.2 Without detriment to that stated in 7.2 and 7.7.5, the DGCA (CAA) will not grant exemptions to the authorisation required to operate on RNAV 5 routes. Consequently, civil aircraft operators are urged to begin the corresponding approval process with the DGCA (CAA) so that they will not be prevented from using such routes as of 18 November 2010.

6.- AIRWORTHINESS AND OPERATIONAL APPROVAL

6.1 For a commercial air transport operator to receive an RNAV 5 authorisation and use RNAV routes in the continental airspace of the xxx FIR, it shall obtain two types of approvals:

a) The airworthiness approval from the State of registry (see Article 31 of the Chicago Convention (ICAO) and paragraphs 5.2.3 and 8.1.1 of Annex 6, Part I); and

b) The operational approval from the State of the operator (see paragraph 4.2.1 and Attachment F to Annex 6, Part I).

6.2 For general aviation operators, the State of registry (see paragraph 2.5.2.2 of Annex 6, Part II) will issue a letter of authorisation (LOA) after determining that the aircraft meets all the applicable requirements of this document for RNAV 5 operations.

6.3 Compliance with airworthiness requirements by itself does not constitute operational approval.

6.4 Advisory circular CA 91-002 “Approval of Aircraft and Operators for RNAV 5 Operations” issued by the ICAO Regional Safety Oversight Cooperation System (SRVSOP) provides acceptable means of compliance (AMC) regarding the approval of aircraft and operators for RNAV 5 operations.

6.5 To supplement the aforementioned advisory circular, the SRVSOP has prepared a Job Aid to provide guidance to the States, operators and inspectors regarding the process to be followed by the operator in order to obtain an RNAV 5 approval. Both documents are posted on the DGCA (CAA) web page, through the link:

www.DGAC/Publicaciones- RNAv 5%

7.- PROCEDURES

7.1 In the xxx FIR, except as stated in 7.2, only aircraft approved for RNAV 5 operations (airworthiness and operations approval) will be able to file flight plans for ATS routes designated as RNAV 5, as specified in the relevant AIP or NOTAM.

7.2 State aircraft, aircraft conducting SAR missions, humanitarian and maintenance or first delivery flights do not require RNAV 5 authorisation. The conditions for filing flight plans are those described in 7.7.5.

7.3 Aircraft operating on RNAV 5 routes will be equipped at least with on-board RNAV equipment that meets an en-route lateral and longitudinal navigation precision of ± 5 NM (± 9,26 KM) 95% of the total flight time.

7.4 Before starting an operation on an RNAV 5 route, the proper operation of the on-board RNAV system will be verified, including:

a) A revision of records and forms, to make sure that maintenance has been performed in order to correct equipment defects;

b) A revision of database validity (current AIRAC cycle), if installed.

c) A revision of the approved flight plan, comparing charts or other applicable resources with the navigation system text display and aircraft display, if applicable. The exclusion of specific navigation aids, if applicable, shall be confirmed.

7.5 When operating on an RNAV 5 route, the proper operation of the on-board RNAV system will be verified, including confirmation:

a) That the equipment required for RNAV 5 operation has not been degraded during the flight;

b) That the route is consistent with the authorisation.

c) Through cross-checks, that the aircraft navigation precision is appropriate for RNAV 5 operation;

d) Other navigation aids shall be selected to permit a cross-check or immediate reversal in case of loss of RNAV capability;

7.6 If the ATC assigns a course that takes the aircraft off the route, the pilot shall not modify the flight plan in the RNAV system until cleared to go back to the route or until the ATC confirms a new authorisation. While the aircraft is not on the designated RNAV route, the specified precision requirement does not apply.

7.7 Flight Planning

7.7.1 An R will be inserted in box 10 (Equipment) of the flight plan to indicate that the aircraft meets the RNAV 5 specification prescribed for the route, and that the operator has obtained an authorisation from the DGCA (CAA) and can meet the conditions of said authorisation. Likewise, a Z will be inserted in box 10 to indicate that box 18 contains a description of the type of RNAV equipment installed on board.

7.7.2 NAV/ will be inserted in box 18 of the flight plan, followed by the corresponding navigation specification code(s), according to the following table:

Code	Navigation Specification
B1	RNAV 5 - All sensors permitted
B2	RNAV 5 - GNSS
B3	RNAV 5 - DME/DME
B4	RNAV 5 - VOR/DME
B5	RNAV 5 - INS or IRS
B6	RNAV 5 - LORAN C

7.7.3 When an aircraft of an operator with an RNAV 5 approval according to item 6 hereof has a failure or degradation prior to departure that prevents it from complying with the prescribed RNAV functionality and accuracy requirements, the operator will not insert the letter R in box 10 of the flight plan. Consequently, for a flight for which a flight plan has been filed, an appropriate new flight plan will be filed and the old one will be cancelled. For a flight operation based on an RPL, the latter will be cancelled and an appropriate new flight plan will be filed.

7.7.4 State aircraft, aircraft conducting SAR missions, humanitarian, and maintenance or first delivery flights that do not have RNAV approval can file flight plans for operations on RNAV routes. These aircraft must complete box 18 by inserting, RMK/NONRNAV10 and/or RMK/NONRNAV5. These aircraft must fill item 18 including after STS/ the reason for the special treatment; for example STATE, HUM, SAR, MAINT and DELIVERY.

7.7.5 Operators filing repetitive flight plans (RPL) will insert in box Q of the RPL all information concerning navigation equipment and capabilities, in keeping with box 10 of the flight plan. This includes the indicators and designators that describe the level of PBN approval granted to the operator.

7.8 Contingency Procedures

7.8.1 Regarding the in-flight degradation or failure of the RNAV system when the aircraft is on an ATS route designated as RNAV 5:

a) The aircraft will be authorised to fly on the ATS routes defined by VOR/DME; or

b) If these routes are not available, the aircraft will be authorised to fly with conventional navigation aids, that is, VOR/DME; or

c) When the aforementioned procedures are not available, the ATC unit will provide the aircraft, whenever possible, with radar vectoring until the aircraft can resume its own navigation.
Note.- Aircraft authorised to fly according to a) or b) may request, whenever possible, radar tracking by the corresponding ATC unit.

7.8.2 ATC measures with respect to an aircraft that cannot meet RNAV requirements due to failure or degradation of the RNAV system will depend on the nature of the reported failure and general traffic conditions. In many cases, operations may continue according to the current ATC clearance. When this is not possible, a revised clearance can be requested, as specified in 7.8.1, in order to revert to VOR/DME navigation.

7.9 PHRASEOLOGY

RNAV 10 (RNP 10) and RNAV 5

Circumstances	*Fraseología*	*Phraseologies*
Informa the ATC on degrading or RNAVfailure.	*(*distintivo de llamada de aeronave*) IMPOSIBLE RNAV DEBIDO A EQUIPO	*(*aircraft call sign*) UNABLE RNAV DUE EQUIPMENT
Informar the ATC that there is no RNAV capacity.	*(*distintivo de llamada de aeronave*) RNAV NEGATIVO	*(*aircraft call sign*) NEGATIVE RNAV
** Indicating a transmission from pilot.*		

8.- ADDITIONAL INFORMATION

Additional information can be obtained through the following contacts:

- General Director of Civil Aviation
  - For certification issues:
    - Nnnnnnnnnnnn e-mail - Airworthiness
    - Nnnnnnnnnnnn e-mail - Operations
  - For airspace issues:
    - Nnnnnnnnnnnn e-mail

- ICAO Lima
  Mr./Ms. xxx xxx (email: xxxxxx@icao.lima.int)

APÉNDICE/APPENDIX D

ENR 3.3 RUTAS DE NAVEGACIÓN DE ÁREA – AREA NAVIGATION ROUTES

Designador de ruta ***(especificación para la navegación)*** ***Nombre de los puntos significativos*** ***Coordenadas*** **Route designator (**Navigation specification**)** **Name of significant points** **Coordinates**	***Derrota*** ***Magnética*** ***Distancias*** **Magnetic track Distances**	***Límites superiores*** ***Límites inferiores*** ***Clasificación del Espacio aéreo*** **Upper limits** **Lower limits** **Airspace Classification**	***Límites laterales*** ***NM*** **Lateral Limits NM**	***Dirección de los niveles De crucero*** **Cruise level direction**		***Observaciones*** ***Dependencia de control*** ***Frecuencia*** **Remarks** **Control Unit** **Frequency**
				Impar **Odd**	***Par*** **Even**	
1	**2**	**3**	**4**	**5**		**6**
UL 775 **(RNAV 5)**				↓		
▲ ESQUEL VOR/DME ESQ 425314S-0710601W	280 101	FL 450 A FL 245	5	▲		ACC Comodoro Rivadavia 125.5 MHz 5547 KHz 11282 kHz
▲ UKEKA 4242232S-0714435W	30 NM					

1. *Especificación para la navegación*: Conjunto de requisitos relativos a la aeronave y a la tripulación de vuelo necesarios para dar apoyo a las operaciones de la navegación basada en la performance (PBN) dentro de un espacio definido. Existen dos clases de especificaciones para la navegación:
   - *Especificación RNAV*: Especificación para la navegación basada en la navegación de área que incluye el requisito de vigilancia y alerta de la performance, designada por medio del prefijo RNAV, por ejemplo RNAV 5, RNAV 1.
   - *Especificación RNP*: Especificación para la navegación basada en la navegación de área que incluye el requisito de vigilancia y alerta de la performance, designada por medio del prefijo RNP, por ejemplo, RNP 4, RNP APCH

1. *Navigation specification*. A set of aircraft and aircrew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specification:
   - *RNAV specification.* A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.
   - *RNP specification.* A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

2. Columna 6: Se insertará informaciones sobre las radio-ayudas críticas para cada tramo de ruta y los sensores aplicables en caso de que la cobertura y/o geometría VOR/DME y/o DME/DME no sean suficientes para atender a los requerimientos RNAV5. /

2 Column 6: Information on critical radio navigation aids will be inserted for each route segment and the applicable sensors in case of VOR/DME and/or DME/DME coverage and/or geometry are not sufficient to meet RNAV5 requirements.

APPENDIX E

PROPOSAL FOR AMENDMENT OF THE REGIONAL SUPPLEMENTARY PROCEDURES SAM REGION (Doc 7030/5)

Serial N° SAM-S 10/01 – SAM, Chapters 2, 4, 6 and 9)

a) Regional Supplementary Procedures:

Doc 7030/5 – SAM

b) Proposed by:

Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Panama, Paraguay, Peru, Suriname, Uruguay, Venezuela and IATA.

c) Proposed amendment:

Editorial note: The amendment has been prepared so that the text to be deleted appears with strike out (~~text to be deleted~~) and new text appears with grey shading (text to be inserted).

"Amend below chapters as follows:

Chapter 2. FLIGHT PLANS

2.1 CONTENT – GENERAL

(A2 – 3.3; P-ATM – Chapter 4 and Appendix 2)

2.1.1 Date of flight

Nil.

2.1.2 Area Navigation (RNAV) Specifications

~~Nil~~

RNAV 10 (RNP10) and RNAV 5

2.1.2.1 The designator R shall be inserted in Item 10 of the flight plan to indicate that the aircraft meets the navigation specification prescribed for the route, and that the operator has obtained an approval from the responsible aviation authority and can meet the conditions of such approval.

2.1.2.2 The indicator NAV/ followed by the corresponding navigation specification code(s), according to the following table, shall be inserted in Item18 of the flight plan:

Code	Navigation Specification
A1	RNAV 10 - (RNP 10)
B1	RNAV 5 - All sensors permitted
B2	RNAV 5 - GNSS
B3	RNAV 5 - DME/DME
B4	RNAV 5 - VOR/DME
B5	RNAV 5 - INS or IRS
B6	RNAV 5 - LORAN C

2.1.2.3 When an aircraft of an operator that has an approval according to 2.1.2.1 has a failure or degradation prior to departure that prevents it from complying with the prescribed navigation specification and accuracy requirements, the operator shall not insert the designator R in Item 10 of the flight plan. For a flight for which a flight plan has already been filed it shall be cancelled and replaced by a new appropriate flight plan.

2.1.2.4 State aircraft, aircraft conducting SAR missions, humanitarian missions, maintenance or first delivery flights that do not have RNAV approval can file flight plans for operations on RNAV routes. These aircraft must complete Item 18 with RMK/NONRNAV10 and/or RMK/NONRNAV5 information. They should also include another STS/ indicator, describing the reason for special handling by ATS; i.e. STATE, HUM, SAR, etc.

2.1.3 Required navigation performance (RNP) specifications

Nil.

~~2.1.3.1 The letter R shall be inserted in Item 10 (Equipment) of the flight plan to indicate the aircraft meets the RNP type prescribed, has been appropriately approved and can comply with all conditions of that approval.~~

…

2.1.11 Mach number

2.1.11.1 For turbo-jet aircraft intending to operate:

a) within airspace and/or routes between Santiago and Lima FIRs and the adjacent control areas of the PAC Region; or

b) at or above FL 250 within the Atlantic, Dakar Oceanic, Recife and Sal Oceanic FIRs; or

c) along area navigation routes; the planned true Mach number shall be specified in Item 15 of the flight plan.

2.4 REPETITIVE FLIGHT PLANS (RPLs)

~~Nil~~

2.4.1 Operators filing an RPL will insert in Item Q of the RPL all information concerning navigation equipment and capabilities, in accordance with Item 10 of the FPL. This includes the indicators and designators that describe the PBN approval granted to the operator.

…

Chapter 4. NAVIGATION

4.1 PERFORMANCE-BASED NAVIGATION (PBN)

Note.— As the South American (SAM) Region transitions to PBN as contained in the Performance-based Navigation Manual *(Doc 9613) the contents of 4.1 will be amended.*

4.1.1 Area navigation (RNAV) specifications

4.1.1.1 RNAV 10 (RNP 10)

Note.— RNAV 10 retains the RNP 10 designation, as specified in the Performance-based Navigation Manual~~*~~ *(Doc 9613), Volume I, Part A. 1.2.~~3.~~5.5.*

Area of applicability

4.1.1.1.1 For flights on designated controlled oceanic routes or areas within the Canarias FIR (southern sector), Atlantico, Dakar Oceanic, Recife and Sal Oceanic FIRs a lateral separation minimum of 93 km (50 NM) may be applied.

4.1.1.1.2 For flights in the EUR/SAM corridor (Canarias (southern sector), Atlantico, Dakar Oceanic, Recife and Sal Oceanic FIRs), a longitudinal separation minimum of 93 km (50 NM) derived by RNAV may be applied between RNAV-equipped aircraft approved to RNP 10 or better, in accordance with the provisions of the PANS-ATM, 5.4.2.6.

4.1.1.1.3 Between flight levels FL290 and FL410 (inclusive), in the segments of parallel routes UL780 and UL302 within the SANTIAGO DE CHILE – LIMA RNP 10 airspace (corridor) (14°23'24''S/077°49'52''W, 14°09'33''S/076°06'04''W, 27°22'16''S/ 072°00'34''W, 27°55'39''S/ 073°46'45''W), an RNAV lateral separation minimum of 93 Km (50 NM) and an RNAV longitudinal separation minimum of 10 minutes / 150 Km (80 NM) between aircraft on the same flight level will be applied. The longitudinal separation minimum will be applied with the MACH number technique.

4.1.1.1.3.1. In the airspace defined above, State aircraft, aircraft conducting SAR missions, humanitarian and maintenance or first delivery flights may be cleared to operate without the RNAV 10 (RNP 10) approval. Conditions concerning flight plan filing according to 2.1.2.4 apply.

Means of compliance

4.1.1.1.4 For application of 4.1.1.1.1, 4.1.1.1.2, and 4.1.1.1.3, the aircraft and the operator must have been approved by the State of Registry or the State of the Operator, as appropriate, to meet the following requirements (or equivalent):

a) **...**
b) **...**
1) **...**
2) **...**

Note.— Detailed guidance material on RNP is contained in the Performance-based Navigation Manual *(Doc 9613)*.
~~*In preparation~~

4.1.1.2 RNAV 5

~~**Nil.**~~
Area of applicability

4.1.1.2.1 In the FIRs listed in 4.1.1.2.3, except for that stated in 4.1.1.2.2, only aircraft holding airworthiness and operational approval to carry out RNAV 5 operations may file flight plans for ATS RNAV 5 routes, as specified in the relevant AIP or NOTAM of each State.

4.1.1.2.2 State aircraft, aircraft conducting SAR missions, humanitarian and maintenance or first delivery flights may be cleared to operate without RNAV 5 approval. Conditions concerning flight plan filing according to 2.1.2.4 apply.

4.1.1.2.3 The following RNAV 5 provisions will apply to IFR operations on designated RNAV 5 continental routes in the following FIRs:

Antofagasta, Amazónica, Asunción, Barranquilla, Brasilia, Bogotá, Comodoro Rivadavia, Córdoba, Curitiba, Ezeiza, Georgetown, Guayaquil, La Paz, Lima, Maiquetía, Mendoza, Montevideo, Panama, Paramaribo, Puerto Montt, Punta Arenas, Recife, Resistencia, Rochambeau and Santiago.

Means of compliance

4.1.1.2.4 Aircraft operating on designated RNAV 5 routes shall be equipped at least with RNAV equipment that meets a lateral and longitudinal en-route navigation accuracy of ± 5 NM (± 9,26 KM) 95% of the total flight time. Other considerations regarding airborne equipment are listed in 4.1.1.2.8 and 4.1.1.2.9.

4.1.1.2.5 The State of Registry or the State of the Operator, as applicable, shall verify compliance with the navigation specifications.

Note.— Guidance on navigation specifications is contained in ICAO Doc 9613, Manual on Performance-based Navigation.

4.1.1.2.6 The proper operation of the RNAV system on board the aircraft shall be verified before starting an operation on an RNAV 5 route. This verification should include, among others:

a) a review of records and forms to make sure that maintenance action has been taken to correct defective equipment; and

b) a validity check of the database (current AIRAC cycle), if installed.

c) a check of the cleared flight plan, comparing the charts and other applicable resources with the navigation system data display and the aircraft display, if applicable. The exclusion of specific radio aids should be confirmed, if applicable.

4.1.1.2.7 The proper operation of the on-board RNAV system shall be verified when operating on an RNAV 5 route, including that:

a) the equipment required for the RNAV 5 operations has not been degraded during the flight;

b) the route corresponds to the authorisation;

c) the navigation accuracy of the aircraft is appropriate for RNAV 5 operations, making use of cross-checks;

d) other navigation aids are selected to allow for cross-check or immediate reversal in case of losing RNAV capability;

4.1.1.2.8 All pilots are expected to maintain route centreline, as represented by on-board lateral deviation and/or flight guidance indicators, during all RNAV 5 operations, unless cleared to deviate by the ATC or under emergency conditions.

4.1.1.2.9 If the ATC assigns a heading that takes the aircraft out of the route, the pilot shall not modify the flight plan in the RNAV system until clearance to return to the route has been received or the ATC confirms a new clearance.

4.1.1.3 RNAV 2

Nil

4.2 REDUCED VERTICAL SEPARATION MINIMUM (RVSM)

Area of applicability

4.2.1 The RVSM of 300 m (1 000 ft) shall be applicable in that volume of airspace between FL 290 and FL 410 inclusive in the following FIRs:

Antofagasta, ~~Amazonas~~ Amazónica, Asuncion, Atlántico ~~to the northwest of the line joining the coordinates 01°39′32″S / 030°13′45″W and 02°23′39″N / 027°48′58″W~~, Barranquilla, Brasilia, Bogota, Comodoro Rivadavia to ~~the west of the meridian 054°W,~~ Cordoba, Curitiba, Ezeiza ~~to the west of the meridian 054°W~~, Georgetown, Guayaquil, La Paz, Lima, Maiquetia, Mendoza, Montevideo, ~~to the west of the line joining the coordinates 34°00′00″S / 050°00′00″W and 36°22′00″S / 054°00′00″W,~~ Panamá, Paramaribo, Puerto Montt, Punta Arenas, Recife, Resistencia, Rochambeau and Santiago.

Chapter 6. AIR TRAFFIC SERVICES

6.1 AIR TRAFFIC CONTROL (ATC) CLEARANCES

…

6.2.2 Longitudinal
(P-ATM – Chapter 5)

6.2.2.1 **…**

6.2.2.2 The RNAV minimum longitudinal separation ~~shall be 15 minutes between turbo-jet aircraft operating~~ of 10 minutes / 150 Km (80 NM) between aircraft on the same flight level, with MACH number technique, shall be applied:

a) on the specified routes in the Lima and Santiago FIRs and the adjacent control areas of the PAC Region; or

b) at or above FL 250 within the Dakar Oceanic, Recife, Atlantic, and Sal Oceanic FIRs, provided that the Mach number technique is applied and, whether in level, climbing or descending flight, the aircraft have reported over the same entry point to the ATS routes or a common entry point into oceanic-controlled airspace and follow the same track or continuously diverging tracks.

6.2.2.3 For aircraft operating on designated controlled oceanic routes in the EUR/SAM corridor within the Dakar Oceanic, Recife, Atlantic, and Sal Oceanic FIRs, the longitudinal separation shall be in accordance with the PANS-ATM, 5.4.2.4 or 5.4.2.5.

…

6.6 RNAV PROCEDURES

RNAV 10 (RNP10) and RNAV 5

6.6.1 General
~~Nil~~

6.6.1.1 Operation of the RNAV System

Note 1.- The means of compliance with RNAV 10 (RNP 10) operational requirements are contained in 4.1.1.1.4.

Note 2.- Functional check procedures prior to entering the RNAV 5 route are contained in 4.1.1.2.6. En-route functional check procedures are contained in 4.1.1.2.7.

6.6.2 En-route

~~Nil~~

Note 1.- The aircraft separation minima applicable on routes designated as RNAV 10 (RNP 10) are contained in 4.1.1.1.1, 4.1.1.1.2, and 4.1.1.1.3.

Note 2.- The functional check procedures and other considerations for RNAV 5 en-route navigation are included in 4.1.1.2.7, 4.1.1.2.8, and 4.1.1.2.9.

6.6.3 Terminal

Nil.

6.6.4 State Aircraft

~~Nil~~

Note.- The conditions for RNAV 10 (RNP 10) and RNAV 5 operation of State aircraft and other aircraft exempt from RNAV approval are contained in 4.1.1.1.3.1 and 4.1.1.2.2, respectively.

…

6.11.2 RNAV

~~Nil~~

(P-ATM – Chapter 11)

RNAV10 (RNP10) and RNAV 5

6.11.2.1 Aircraft experiencing RNAV system degradation or failure

6.11.2.1.1 When using a verbal coordination procedure, the sending ATS unit shall include the phrase “RNAV UNAVAILABLE” at the end of the message.

6.11.2.1.2 In case of coordination through automated messages containing the information provided in Item 18 of the flight plan, the sending ATS unit shall verbally supplement the coordination message with the phase “RNAV UNAVAILABLE” after the call sign of the corresponding aircraft.

6.11.2.2 State aircraft and other aircraft exempt from RNAV approval

6.11.2.2.1 When using verbal coordination, the sending ATS unit shall include the phrase "NEGATIVE RNAV" at the end of the message.

6.11.2.2.2 In case of coordination through automated messages that do not contain the information provided in Item 18 of the flight plan, the sending ATS unit shall verbally supplement coordination message with the phrase "NEGATIVE RNAV" after the call sign of the aircraft involved.

…

Chapter 9. SPECIAL PROCEDURES

9.1 …

…

9.4 DEGRADATION OR FAILURE OF THE RNAV SYSTEM

9.4.1 Action by the pilot-in-command

~~**Nil.**~~

9.4.1.1 When an aircraft cannot meet the requirements, as required by the RNAV route, as a result of a failure or degradation of the RNAV system, a revised clearance shall be requested by the pilot.

9.4.2 Action by the ATS unit

~~**Nil.**~~

9.4.2.1 Regarding in-flight degradation or failure of the RNAV system, when the aircraft is on the RNAV 5 designated ATS route:

a) the aircraft should be cleared to fly on the ATS VOR/DME routes; or

b) if such routes are unavailable, the aircraft should be cleared to fly via conventional navigation aids, i.e. VOR/DME; or

c) when the aforementioned procedures are unavailable, the ATC unit should provide the aircraft, whenever possible, with radar vectors until the aircraft can resume its own navigation.

Note.- Aircraft cleared according to a) or b) may require, whenever possible, radar tracking by the corresponding ATC unit.

9.4.2.2 Subsequent measures by the ATC with respect to an aircraft that cannot meet the RNAV requirements due to a failure or degradation of the RNAV system will depend on the nature of the reported failure and general traffic condition. In many cases, they will be able to continue operating according to the current ATC clearance. When this is not possible, a revised clearance can be requested, as specified in 9.4.1.1, in order to return to VOR/DME navigation.

…

Chapter 10. PHRASEOLOGY

10.1 RNAV

~~**Nil.**~~

RNAV 10 (RNP 10) and RNAV 5

Circumstances	*Phraseologies*	*Phraseologies*
Inform ATC about RNAV degradation or failure		*(*aircraft call sign*) UNABLE RNAV DUE EQUIPMENT
Inform ATC that RNAV capability is not available		*(*aircraft call sign*) NEGATIVE RNAV
** Indicates pilot transmission*		

…”

d) Date when proposal received:

01 August 2010

e) Proposers reason for amendment:

RNAV5 Implementation will be carried out on 18 November 2010.

f) Proposed implementation date of the amendment:

18 November 2010.

g) Action by the Secretary General:

The proposal has been circulated to the following States and International Organizations:

Algeria
Argentina*
Angola
Austria
Belgium
Bolivia*
Brazil*
Bulgaria
Canada
Cape Verde
Chile*
Colombia*
Côte d'Ivoire
Cuba
Denmark
Dominican Republic
Equador*
Egypt
France
French Guyana
Germany
Ghana
Guyana*
Haiti
Hungary
Iceland
Ireland
Italy
Jamaica
Luxemburg
Mauritania
Mexico
Monaco
Morocco
Namibia
Netherlands
Nigeria
Norway
Panamá*
Paraguay*
Perú*
Poland
Portugal
Romania
Russian Federation
Senegal
South Africa
Spain
Suriname
Sweden
Trinidad and Tobago
United Kingdom
United States
Uruguay*
Venezuela*

ASECNA
EUROCONTROL
IATA*
IFALPA

*for information

h) Secretariat's comments:

1. During GREPECAS/14 (San José, Costa Rica, 16 – 20 April 2007), a perfomance-based navigation (PBN) implementation strategy was established in the CAR and SAM Regions at short (up to 2010) and mid (2011-2015) term, which was included in the CAR/SAM PBN Roadmap document. In view of the above, Conclusion 14/46 "*CAR/SAM PBN Roadmap"* was approved, encouraging States/Territories and International Organizations to adopt and apply the CAR/SAM PBN Roadmap as approved by GREPECAS.

2. Keeping in mind that the CAR/SAM PBN Roadmap proposes RNAV5 implementation for en-route implementation in the short term, the SAM Implementation Group (SAM/IG) prepared and approved the associated action plan, which has enabled the development of the corresponding activities for the application of RNAV5 within the ICAO South American Region.

3. Safety assessment before RNAV5 implementation was carried out by a Group of Experts, with the assistance of the CAR/SAM Regional Monitoring Agency (CARSAMMA), using qualitative methodology, as established in Manual SMM (Doc. 9859), and, as indicated in the PBN Manual (Doc. 9613), and the result shows that implementation, from the safety point of view is safe and no elements affecting safety will be introduced in the South American Region airspace.

4. With RNAV5 implementation, it is expected to directly contribute to the achievement of ICAO strategic objectives: safety, environment protection, and efficiency of aviation operations.

- END –

APPENDIX F

DRAFT

PROGRAMME FOR MONITORING OPERATIONS ON RNAV5 ROUTES FOLLOWING IMPLEMENTATION

1 Introduction

Navigation performance oversight is mandatory for two reasons:

a) The demonstrated "typical" navigation precision serves as the basis for determining whether or not the aircraft operating on RNAV routes meet the required performance;

b) Lateral spacing between routes and the separation minima required for a given route are determined according to basic performance and system failures, which are normally rare.

In order to determine the overall safety of the system and check if the ATS system meets the required safety level, it is necessary to monitor both lateral performance and failures.

2 Programme for monitoring operations on RNAV5 routes

The Programme for **monitoring** operations **on RNAV5 routes** consists of monthly reports by the ACCs, covering the following items:

- Errors made by air traffic controllers in connection with RNAV5.
- Errors made by pilots in connection with RNAV5.
- ATS coordination discrepancies in connection with RNAV5.
- Degradation of the on-board navigation system.
- Air traffic incidents related to RNAV5, including the use of phraseology, flight plan management inconsistencies, discrepancies in the status of the authorisation granted to the aircraft operator.
- Specific situation of non-RNAV5 aircraft that should have been directed along alternate (conventional) routes. Also, the impact of this situation on the operational scenario and/or other RNAV5-approved flights.

3 Collection and assessment of navigation errors

The ACCs will collect, on a monthly basis, all lateral/longitudinal navigation error reports for inclusion in the F XX forms, as specified in Appendix A to this paper, and delivery to CARSAMMA by the 10th of the following month.

Furthermore, the ACC safety management unit (or equivalent unit of the ATC service provider) shall assess each lateral/longitudinal blunder error report.

The results of each individual assessment shall be reflected in a technical/operational report that will determine the probable causes and contributing factors of the navigation error, and will recommend measures to prevent that error from happening again. *Inter alia*, these recommendations shall be aimed at:

- The modification of standards and procedures
- The modification of the separation between routes
- The modification of Letters of Operational Agreement
- New ATC automated system requirements.

ATTACHMENT TO APPENDIX F

LATERAL/LONGITUDINAL NAVIGATION DEVIATION REPORTING FORM

Report to the Caribbean and South American Monitoring Agency (CARSAMMA) any horizontal/longitudinal navigation deviation, including:

1) those caused by the ACAS/TCAS; and
2) those resulting from turbulence and/or contingencies

*NOTE: If there is **NO** lateral/longitudinal navigation deviation in the area of responsibility of the ATC body during the period in question, **Section I** STILL needs to be completed and this report sent to the CARSAMMA address listed below by the 10th of the following month.*

ATC unit/OPERATOR: _____

Please complete Section I or II, as applicable.

SECTION I:

NO lateral/longitudinal navigation deviations were reported in the month/year _____

SECTION II:

_____ report(s) of blunder errors and/or navigation deviations were filed with respect to the aircraft authorised to operate in PBN airspace. Deviation details are shown in the attached form(s).

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

SECTION III:

Once completed, please send the report(s) to:
Agencia de Monitoreo del Caribe y Sudamérica (CARSAMMA)
Assessoria de Segurança no Controle do Espaço Aéreo (ASEGCEA)
PRAÇA SENADOR SALGADO FILHO, S/N – CENTRO
20021-370 - RIO DE JANEIRO - RJ
Telephone: (55-21) 2101-6358 Fax: (55-21) 2101-6358
e-mail**: carsamma@decea.gov.br**

INSTRUCTIONS FOR COMPLETING THE FORM

Complete each box, as numbered below, according to the following instructions:

1. DATE IN WHICH THIS FORM WAS COMPLETED.

2. ICAO LETTERS IDENTIFYING THE ATC UNIT OR OPERATOR.

3. TYPE OF DEVIATION (LATERAL OR LONGITUDINAL).

4. INSERT THE ICAO IDENTIFICATION LETTERS FOR THE AIRCRAFT OPERATOR, OR, IN THE CASE OF GENERAL AVIATION, INSERT “IGA”.

5. INSERT THE AIRCRAFT CALL SIGN AND REGISTRATION.

6. INSERT THE AIRCRAFT TYPE ACCORDING TO ICAO DOC 8643; FOR EXAMPLE, FOR AIRBUS A320-211, INSERT A320; FOR BOEING B 747-438, INSERT B744.

7. DESCRIBE HOW WAS THE EVENT OBSERVED: WHETHER BY MODE C OR REPORTED BY THE PILOT, INDICATING FLIGHT LEVEL, IF APPLICABLE.

8. INSERT THE DATE OF OCCURRENCE.

9. INSERT THE TIME OF OCCURRENCE.

10. INSERT THE LOCATION OF THE OCCURRENCE (LATITUDE / LONGITUDE, FIX OR VOR RADIAL, AND NAUTICAL MILES FROM A POINT).

11. ROUTE ON WHICH THE EVENT OCCURRED (IN THE CASE OF DIRECT OR RANDOM FLIGHT, INSERT “DCT”).

12. FLIGHT LEVEL ASSIGNED EN ROUTE.

13. TIME FLOWN INCORRECTLY, IN SECONDS.

14. IF THE OCCURRENCE INVOLVES ANOTHER AIRCRAFT, INSERT THE CALL SIGN, REGISTRATION, FLIGHT LEVEL, AIRCRAFT TYPE AND ROUTE.

15. DESCRIBE THE CAUSE OF THE DEVIATION, ACCORDING TO TABLE 1.

16. THE OBSERVED/REPORTED POSITION OF THE AIRCRAFT, CHOSING ONE OPTION WITH AN “X”. INDICATE THE SOURCE OF INFORMATION (MODE C AND/OR THE PILOT).

17. THE MAGNITUDE (DISTANCE) OF THE LATERAL/LONGUITUDINAL DEVIATION, IN NAUTICAL MILES (NM).

18. BRIEF DESCRIPTION OF THE DEVIATION.

19. COMMENTS BY THE CREW, IF ANY.

TABLE 1

CAUSES OF THE LATERAL / LONGITUDINAL DEVIATION
A - Deviation due to meteorological conditions, when ATC clearance cannot be obtained before.
B – Deviation due to warning from the collision avoidance system (ACAS / TCAS).
C – Deviation due to unexpected event - contingency (engine failure, pressurisation failure).
D – Equipment control degradation or error, including incorrect operation of its FMS functions or navigation system (*e.g.*, by error, the pilot operates the INS equipment incorrectly).
E – Incorrect information transcribed to the FMS (*e.g.,* flight plan followed instead of the ATC clearance, or original authorisation instead of a new clearance issued by the ATC unit).
F – Error in the handover message between adjacent ATC units (coordination loop error).
G – Absence of ATC coordination (lack of coordination).
1 - Failure reported to ATC in time to take action.
2 - Failure reported to ATC too late to take action.
3 - Failure reported/received by ATC.
O – Other.
P - Unknown.

Notes:

1. There are data that must be reported by the pilot.

2. (*) Error in the handover message between adjacent ATC units (coordination loop error):

Any error caused by a misunderstanding between the pilot and the controller with respect to the Mack number or the route to be followed. Such errors can result from ATC coordination loop errors or from a misinterpretation by the pilot of a clearance or clearance renewal. (Doc. 9689-NA/953, Manual on airspace planning methodology for the determination of separation minima.)

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

LATERAL/LONGITUDINAL NAVIGATION DEVIATION FORM

Report of a navigation deviation to CARSAMMA, including those resulting from TCAS, turbulence, and contingencies.

1. Today's date:	2. ATC unit / operator:		
DEVIATION DETAILS			
3. ☐ **LATERAL** ⇔ ☐ **LONGITUDINAL** ⇕			
4. ACFT operator:	5. Call sign: Aircraft registration:	6. Type of ACFT:	7. Mode C observed: ❑ Yes. ¿What level? _____ ❑ No.
8. Date of the occurrence:	9. UTC time:	10. Location of the occurrence (lat/long or fix):	
11. Designated route:			
12. Designated flight level:	13. Estimated duration of incorrect flight (seconds):		
14. Other traffic (if any):			
15. Cause of the deviation (*brief title*): (Examples: ATC coordination loop operational error, turbulence, weather, equipment failure)			

DEVIATION		
16. Observed/reported deviation *: *Indicate the source of information: ❑ Mode C ❑ Pilot	To the left of the designated path: ❑ To the right of the designated path: ❑ Ahead of the estimated position: ❑ Behind the estimated position: ❑ ATS route inconsistent with the flight plan: ❑	17. Magnitude of the observed/reported lateral/longitudinal deviation, in nautical miles: Lateral _____NM Longitudinal _____NM

NARRATION
18. Detailed Description of the Deviation (*Please, evaluate the track flown by the aircraft and the cause of the deviation.*)

19 – COMMENTS BY THE CREW (IF ANY)

After completing this form, please send the report(s) to:
Agencia de Monitoreo para el Caribe y Sudamérica (CARSAMMA)
Assessoria de Segurança no Controle do Espaço Aéreo (ASEGCEA)
PRAÇA SENADOR SALGADO FILHO, S/N – CENTRO 20021-370 - RIO DE JANEIRO - RJ
Telephone: (55-21)2101-6358 Fax: (55-21) 2101-6358
E-mail: **carsamma@decea.gov.br**

APPENDIX G

SHORT-TERM EN-ROUTE PBN ACTION PLAN (RNAV-5)
(GPIs 1, 4, 5, 7, 8, 10, 11, 12, 16, 21, 23)

1.	**Airspace concept**	**Start**	**End**	**Responsible party**	**Remarks**
1.1	Establish and prioritize strategic objectives (safety, capacity, environment, etc.)	June/2008	SAM/IG/2	SAM/PBN/IG (Project RLA/06/901)	Completed
1.2	Collect traffic data in order to understand traffic flows in a given airspace	June/2008	SAM/IG/4	SAM/PBN/IG (Project RLA/06/901)	Completed
1.3	Analyze the navigation capacity of the aircraft fleet	June/2008	SAM/IG/7	SAM/PBN/IG (Projects RLA/06/901 and RLA/99/901) States IATA	Valid 95% of the fleet in the SAM Region is candidate for RNAV5 approval. States should continue their efforts to complete the data base (Conclusion SAM/IG/4-3)
1.4	Analyze ground-based means of communication, navigation (VOR, DME) and surveillance to meet navigation specifications and the navigation reversal mode	June/2008	SAM/IG/7	SAM/PBN/IG (Projects RLA/06/901 and RLA/99/901) States	Valid The work will be completed through a workshop in March 2011, in order to prove that the coverage and geometry corresponds to RNAV5. The support of RLA/06/901 will be requested to hire two experts and 1 fellowship per State participating in the project.
1.5	Optimize airspace structure, reorganizing the network or implementing new routes based on the strategic objectives of the airspace concept, taking into account airspace modelling, ATC simulations (fast time and/or real time), live tests, etc.	SAM/IG/2	SAM/IG/4	SAM/PBN/IG (Project RLA/06/901) States IATA	Transferred. The meeting reviewed this task and decided that it was more appropriate to incorporate to the SAM Region ATS routes network optimization action plan (2.2.5 SAM Region ATS routes network optimization action plan)

2	**Safety assessment**	**Start**	**End**	**Responsible party**	**Remarks**
2.1	Prepare safety assessment execution using a qualitative methodology through the application of SMS	SAM/IG/2	SAM/IG/6	CARSAMMA Project RLA/06/901 Regional Office	**Completed**

3	**Establish a collaborative decision-making process (CDM)**	**Start**	**End**	**Responsible party**	**Remarks**
3.1	Coordinate planning and implementation requirements with air navigation service providers, regulators, users, aircraft operators and military authorities	SAM/IG/2	SAM/IG/6	SAM/PBN/IG States	**Valid** Some States have published an initial AIC. Other States have not done so yet. A new AIC is required informing on the change of implementation date.
3.2	Establish the implementation date	SAM/IG/1	SAM/IG/4	SAM/PBN/IG States	**Completed.** 18 November 2009 was established as tentative date. States must analyse the feasibility of the tentative date in coordination with domestic operators and military authorities
3.3	Establish the documentation format in the SAM PBN website	SAM/IG/1	SAM/IG/2	SAM Regional Office	**Completed**
3.4	Report planning and implementation progress to the corresponding Regional Office. Conclusion to present national plans at SAM/IG/4	SAM/IG/2	SAM/IG/4	SAM/PBN/IG States	**Completed.** Eight SAM States presented a draft of their national PBN implementation plans and it was agreed that for 31 December 2009, States shall present the final version of the plan. The Secretariat was requested to as States that have not done so yet, submit their respective plans.

4	**ATC automated systems**	**Start**	**End**	**Responsible party**	**Remarks**
4.1	Assess PBN implementation in ATC automated systems, taking into account amendment 1 to the PANS/ATM (FPLSG). Note: It is not a requirement for RNAV5 implementation	June/2008	SAM/IG/4	SAM/PBN/IG (Project RLA/06/901)	**Completed** According to the programme presented in ICAO guidelines (WP/09), it is not a requirement for the RNAV5 implementation. CNS/ATM sub-group will revise this issue.
4.2	Implement necessary changes in automated ATC systems	SAM/IG/2	TBD	States	**Completed**

5 Aircraft and operator approval	Start	End	Responsible party	Remarks
5.1 Analyze aircraft and operator approval requirements (pilots, dispatchers and maintenance personnel) in keeping with the PBN manual, and develop the necessary documentation.	June/2008	SAM/IG/2	Regional Project RLA/99/901- Regional Safety Oversight Cooperation System	**Completed**
5.2 Publish national regulations for the implementation of the RNAV-5 navigation specification	SAM/IG/2	SAM/IG/7	States	**Valid** There are some States in development process of their regulations, and for this reason, this task is pending. Three States of the Region have published the regulations and 9 States informed that this task is in execution. No information is available from 2 States.
5.3 Begin the approval of aircraft and operators	SAM/IG/3	SAM/IG/7	States	**Valid** This is a continuous task that States have initiated and shall continue to carry out upon requirement of operators. Operators should be encouraged to initiate this process.
5.4 Establish and keep up to date a registry of approved aircraft and operators	SAM/IG/3	Permanent	CARSAMMA States Regional Office	**Valid** CARSAMMA has not received yet information on approvals. This is an activity being developed permanently by each one of the States.
5.5 Verify the operation of the continuous monitoring programme (aircraft and procedures)	Nov/2010	Permanent	States	**Completed** This is an activity being developed permanently by each on of the States and is considered in the surveillance plans.

6	Standards and procedures	Start	End	Responsible party	Remarks
6.1	Assess and, if applicable, publish the regulations on the use of GNSS.	June/2008	SAM/IG/2	SAM/PBN/IG (Project RLA/06/901) States	**Completed**
6.2	Finalize WGS-84 implementation	TBD	TBD	States	**Completed** States which have not done so, should provide the information
6.3	Develop an AIC model to report PBN implementation plans	June/2008	SAM/IG/2	SAM/PBN/IG (Project RLA/06/901)	**Completed**
6.4	Publish the AIC reporting PBN implementation plans	SAM/IG/2	SAM/IG/4	States	**Completed** States should publish on 9 April 2009
6.5	Develop an AIP Supplement model containing applicable standards and procedures, including the corresponding in-flight contingencies	SAM/IG/4	June 2010	SAM/PBN/IG (Project RLA/06/901)	**Completed**
6.6	Publish the AIP Supplement containing applicable standards and procedures, including the corresponding in-flight contingencies	SAM/IG/5	SAM/IG/7	States	**Valid** A format to publish RNAV ENR 3.3 routes was approved.
6.7	Review the Procedural Handbook of the ATS units involved	SAM/IG/5	SAM/IG/7	States	**Valid**
6.8	Update the letters of agreement between ATS units	SAM/IG/5	SAM/IG/7	States	**Valid** Several States have updated their LOAs. The process is on going.
6.9	Develop an amendment to regional documentation, if necessary	SAM/IG/3	June 2010	SAM/PBN/IG (Project RLA/06/901)	**Completed**
6.10	Submit a proposal of amendment to Doc. 7030, if necessary	SAM/IG/5	SAM/IG/6	SAM Regional Office	**Completed**

7. Training	Start	End	Responsible party	Remarks
7.1 Develop a training and documentation programme for operators (pilots, dispatchers and maintenance personnel)	SAM/IG/4	SAM/IG/5	Regional Project RLA/99/901	**Completed** The matters to be incorporated into each one of the training programmes of operators have been included in the corresponding advisory circulars
7.2 Develop a training and documentation programme for air traffic controllers and AIS operators	SAM/IG/4	SAM/IG/5	SAM/PBN/IG (Project RLA/06/901)	**Completed**
7.3 Develop a training programme for regulators (aviation safety inspectors)	SAM/IG/4	SAM/IG/5	RLA/99/901 States	**Completed** The SRVSOP technical committee has proposed a training programme oriented to the authorities
7.4 Conduct training programmes	SAM/IG/5	SAM/IG/7	States	**Valid** Only some States have initiated this process.
7.5 Conduct seminars for operators, explaining plans and expected operational and economic benefits	SAM/IG/1	SAM/IG/7	States	**Valid** There is information that only some States have initiated the guidance process to users, and therefore all States are encouraged to implement the dissemination programme among such users.

8. Implementation decision	**Start**	**Responsible party**	**Remarks**
8.1 Assess the available operational documentation (ATS, OPS/AIR)	SAM/IG/7	States	**Valid**
8.2 Assess the percentage of aircraft and operators (non-exclusionary airspace)	SAM/IG/7	States	**Valid** It was decided to carry out a new air traffic data collection comprised within the period 1-15 July 2010. The data collection is expected to be revised regarding the amount of aircraft approved through the hiring of one expert by RLA/06/901
8.3 Analyze the results of the safety assessment	SAM/IG/6	States	**Completed**
8.4 Publish trigger NOTAM	Sep/2011	States	**Valid**

9. Performance monitoring system	**Start**	**End**	**Responsible party**	**Remarks**
9.1 Develop a post-implementation en-route operations monitoring programme	SAM/IG/4	SAM/IG/6	SAM/PBN/IG (Project RLA/06/901)	**Completed**
9.2 Implement a post-implementation en-route operations monitoring programme	Sep 2010	Sep 2011	States	**Valid**
Pre-operational implementation date	22 September 2011	N/A		**Valid** SAM/IG/4 defined the tentative implementation date 18 November 2010.
Definitive implementation date	Sep 2012	N/A		

APÉNDICE / APPENDIX H

LISTA DE VERIFICACIÓN DE TAREAS PARA LA IMPLANTACIÓN DE RNAV5/TASKS CHECKLIST FOR RNAV5 IMPLEMENTATION

La siguiente Lista de verificación sobre las tareas consideradas críticas para la implantación RNAV5 se ha elaborado tomando como base la información contenida en el plan de acción para la implantación RNAV5 en ruta, las conclusiones y actividades identificadas por el Grupo de Implantación SAM.

Considerando la cantidad y diversidad de los asuntos, actividades y tareas a realizarse y que en esta etapa del proceso de implantación de la RNAV5 ya debe haberse culminado, sino todas, la mayoría de ellas, las preguntas formuladas se refieren a la parte fundamental del tema en cuestión, entendiéndose que una respuesta afirmativa a dicha pregunta indicaría que efectivamente se ha culminado todo el proceso correspondiente y que solamente cuando alguna tarea o actividad específica no se haya finalizado, se explique brevemente en la parte de observaciones.

N/A significa NO APLICABLE

The following checklist on the tasks considered critical for RNAV5 implementation has been prepared, based on the information contained in the action plan for en-route RNAV5 implementation, the conclusions and activities identified by the SAM Implementation Group.

Taking into consideration the amount and diversity of issues, activities and tasks to be carried out and that in this phase of the implementation process of RNAV5 all or almost all tasks must have been completed. The questions formulated refer to the main part of the referred matter, understanding that an affirmative response to such question would indicate that all the corresponding process has terminated and that only when some specific task or activity has not been finalised, it should be briefly explain in the part corresponding to remarks.

N/A means NOT APPLICABLE

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
¿Ha publicado una reglamentación nacional para la aprobación RNAV5 de aeronaves y operadores aéreos derivada de la CA91-002? Have you published a national regulation for RNAV5 aircraft and operations approval derived from the CA91-002?	**SI**		**OG**		**SI**	**NO**			**SI**	**OG**	**SI**		**SÍ**	**SI**	**Uru** 91.225, 121.607, 135.165 **VEN**: NC-65-91

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
Está el material de orientación para la aprobación RNAV5 disponible para los operadores? Is RNAV5 approval guidance material available to operators?	**SI**		**SI**		**SI**	**OG**			**SI**	**OG**	**SI**		**SÍ**	**SI**	**BRA**: Existe la reglamentación para BRNAV, que está siendo armonizada con la AC 91-002/ There is a regulation for BRNAV being harmonized by AC 91-002. **ECU**: Mayo/May 2011 **VEN**: www.inac.gob.ve
De requerirlo, la AAC ha publicado los antecedentes que deberán presentar los operadores extranjeros que deseen operar en su territorio para que se reconozca la autorización RNAV 5 emitida por su Autoridad? Si es afirmativo indicar el documento o link en donde se puede encontrar. If appropriate the CAA has published the background information to be presented by foreign operators who wish to operate in your territory so that RNAV5 clearance issued by your authority is recognized?	**SI**		**SÍ**						**SI**	**NO**			**NO**	**NO**	**BRA**: Link: www.anac.gov.br/biblioteca/rbha/rbha129.pdf **PAN**: Link: www.aeronautica.gob.pa/aac/racp/pdf/RACP_LIB_XXV.pdf (ref. RACP LIBRO XXV articulo 5) **VEN**: no solicita procedimientos administrativos suplementarios./ Not requesting supplementary administrative procedures

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
De requerirlo, la AAC ha publicado los antecedentes que deberán presentar los operadores extranjeros que deseen sobrevolar su territorio para que se reconozca la autorización RNAV 5 emitida por su Autoridad? Si es afirmativo indicar el documento o link en donde se puede encontrar. If appropriate the CAA has published the background information to be presented by foreign operators who wish to over-fly in your territory so that RNAV5 clearance issued by your authority is recognized? If affirmative, indicate the document or link in which it may be found.			**SI**						**NO**	**NO**			**NO**		**BRA**: Link: www.anac.gov.br/biblioteca/iac/iac2216.pdf **VEN**: La normativa está siendo actualizada para contemplar la RNAV5. Regulation is being updated to observe RNAV5. **Uruguay** reconoce las autorizaciones emitidas por la AAC de origen. No tenemos requerimientos especiales. Uruguay recognizes authorizations of origin issued by AAC. We do not have special requirements.
¿Se ha efectuado una encuesta a los operadores para determinar sus planes para la aprobación RNAV5? Has a survey of operators been conducted to determine RNAV5 plans for RNAV5 approval?	**SI**		**SÍ**		**SI**	**O/G**			**OG**	**OG**			**SI**		**ECU**: Mayo/ May 2011

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
¿Cuántas aeronaves registradas (elegibles) en el Estado cumplen con los requisitos para la certificación de aeronavegabilidad RNAV5? How many State registered (eligible) aircraft comply with the requirements for RNAV5 airworthiness certification?	**OG**		**310**		**NO**	**O/G**			**OG**	**OG**			**17**		**BRA**: número aproximado, será actualizado oportunamente/ Approximate number, will be duly updated. **ECU**: Mayo/May 2011 **PAN**: se encuentran en proceso de autorización aprox 50 Acft a la fecha. In process of approval Approc 50 acft to date.
¿Cuántas aeronaves nacionales han recibido aprobación para la aeronavegabilidad RNAV5? How many national aircraft have received RNAV5 airworthiness certification?	**OG**	-	**310**		**NO**	**NO**	-	**N/A**	**OG**	**N/A**			**0**		**BRA**: número aproximado, será actualizado oportunamente/ Approximate number, will be duly updated. **PAN**: en proceso/on going
¿Cuántos operadores nacionales han recibido aprobación RNAV5? How many national operators have received RNAV5 approval?	**OG**	-	**7**	**OG**	**NO**	**NO**	-	**N/A**	**OG**	**N/A**		-	**0**	-	**PAN**: en proceso/ On going

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
¿Han proporcionado aprobación RNAV5 a aeronaves individuales de aviación general? Have you provided RNAV5 approval to general aviation individual aircraft?	**OG**		**NO**		**NO**	**NO**			**NO**				**NO**		**PAN**: ninguna solicitada/ None requested
¿Están proporcionando a la CARSAMMA información sobre aprobación RNAV5? Are you providing CARSAMMA with RNAV5 approval data?	**OG**		**NO**		**NO**	**NO**			**NO**	**NO**			**NO**		**PAN:** se va a iniciar el proceso/ Process bill be initiated
¿Ha completado la Administración las actividades relacionados con la capacitación RNAV5 para los inspectores OPS/AIR? Has the Administration completed all the training activities related with RNAV5 to OPS/AIR inspectors?	**SI**		**SI**		**SI**	**O/G**			**OG**	**NO**	**SI**		**SI**		**ECU**: Mayo/May 2011 **PAN**: Se está programando un curso para los inspectores que faltan/ A course is being programmed for inspectors who have not taken it. **PERU** participó en cursos en la oficina SAM. Aun faltan cursos internos en la misma DGAC. PERÚ participated in courses at the SAM Office. Some internal courses from CAD are missing.

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
¿Se ha publicado el NOTAM/AIC inicial informando la fecha y el escenario para la implantación RNAV5? Has the initial NOTAM/AIC announcing the RNAV5 implementation date and scenario been published?	**SI**		**SI**		**SI**	**SI**			**SI**	**SI**	**SI**		**SI**		**URU**: AIC/04 09 apr 2009
¿Se ha publicado o tiene planes para la publicación del Suplemento al AIP para la implantación PBN? Has the AIP Supplement for PBN implementation been published or do plans exist to publish it?	**SI**		**SI**		**SI**	**O**			**SI**	**SI**	**SI**		**SI**		**URU**: AIC/04 09 abril 2009 **PER** El 21 de octubre se emite SUP con procedimientos RNP APCH para Piura. En Chiclayo se publica RNP APCH para el próximo ciclo AIRAC/ On 21 October SUP with RNP APCH procedures was published for Piura. For next AIRAC Cycle it will be published in Chiclayo.

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
¿Están difundiendo información relacionada con el programa RNAV5? Are you disseminating information about the RNAV5 programme?	**SI**		**SI**		**SI**	**NO**			**SI**	**OG**	**SI**		**NO**		**PER** Si se ha diseminado pero no hay respuesta positiva de explotadores. LAN tiene planes para solicitar aprobaciones pero se presume que en el 2011 PER: ON 21 Oct SUP with RNP APCH Procedures is issued for Piura. In Chiclayo RNP APCH is published for next AIRAC cycle. PER has been disseminated but there is no positive .reply from operators. LAN has plans to request approval but assumes in 2011.
¿Ha completado la Administración todas las actividades relacionadas con la capacitación RNAV5 para ATCOs? En caso de que no se haya completado la capacitación, indíquese la fecha prevista de finalización. Has the Administration completed all the training activities related to RNAV 5 for ATCO? In case that training is not completed, indicate the finalization planned date.	**SI**		**OG**		**NO**	**NO**			**OG**	**OG**	**SI**		**NO**		**BRA:** fecha prevista de término: 15/09/2011/ Date foreseen for end: 15/09/2011. **ECU**: Mayo/May 2011 **PAN**: Programa para inicio de noviembre/programmed for early November **URU**: 15/11 **PER** Se ha iniciado desde agosto cursos en Lima y el interior./Courses in Lima and provinces have been initiated since August

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
¿Ha revisado y actualizado el Manual de procedimientos de las unidades ATS involucradas? Has revised and updated the Procedural Manual of ATS units involved?	**OG**		**OG**		**NO**	**NO**			**OG**	**SI**			**NO**		**BRA**: fecha prevista de término: 30/08/2011/Date foreseen to end: 30/08/2011. **PAN**: en proceso/On going
¿Están proporcionando a CARSAMMA informes mensuales sobre Grandes Desviaciones de Altitud (LHD) y tiene planes para continuar enviando además los desvíos laterales (LD)? Are you providing CARSAMMA monthly reports on Large Height Deviations (LHD) and have you plans to continue reporting the lateral deviation (LD)?	**SI**		**SI**		**NO**	**YES**			**SI**	**SI**	**SI**		**SI**		
¿Están proporcionando CARSAMMA informes anuales sobre el total de los movimientos IFR en el espacio aéreo superior? Are you providing CARSAMMA annual reports of total IFR movements?	**SI**		**SI**		**NO**	**SI**			**NO**	**SI**			**SI**		PAN: Se tomarán las acciones para cumplir/actions to comply will be taken

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
¿Han identificado alguna necesidad de actualización en la automatización o equipos ATC, incluyendo Sistemas de procesamiento de datos de vuelo, Ej. franjas? Have you identified any necessary ATC automation or equipment upgrades, including Flight data processing systems, i.e. stripes?	**SI**		**SI**		**SI**	**SI**			**OG**	**OG**	**SI**		**SI**		**PAN**: no se ha considerado/ Has not been considered **PER**: En Julio 2011 estaría operando el centro de control AIRCON 2100 de INDRA/In July 2011 the AIRCON 2100 from INDRA would be operating.
¿En caso de respuesta afirmativa, han iniciado las actualizaciones necesarias en la automatización o equipos ATC? In case of a positive answer, have you initiated the necessary ATC automation or equipment upgrades?	**OG**		**SI**		**NO**	**O/G**				**OG**	**SI**		**NO**		**ECU**: Sólo se ha hecho un diagnostic/Only one diagnosis has been made. PER En Julio 2011 estaría operando el centro de control AIRCON 2100 de INDRA/In July 2011 the AIRCON 2100 from INDRA would be operating.
¿Planea adecuar aeronaves sin aprobación RNAV5 que efectúan operaciones domésticas? Do you plan to accommodate non-RNAV5 approved aircraft conducting domestic operations?	**OG**		**NO**		**NO**	**SI**			**NO**	**SI**	**SI**		**SI**		PER Aun no se han determinado las condiciones, pero se espera acomodamiento de estas aeronaves./No conditions have been determined yet but accommodation of these aircraft is expected.

Conclusión/Tarea Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	OBSERVACIONES REMARKS
En caso de respuesta anterior afirmativa, ¿ha desarrollado procedimientos para acomodar aeronaves domésticas sin aprobación RNAV5? In case that previous answer was positive, have you developed procedures for accommodating non-RVSM approved domestic aircraft?	-		**N/A**		**N/A**	**O/G**				**SI**	**SI**		**NO**		**ECU**: Mayo/May 2011 **PER** Aun no se han determinado las condiciones, pero se espera acomodamiento de estas aeronaves./No conditions have been determined yet but accommodation of these aircraft is expected.
¿Ha actualizado las LOAs para contemplar la RNAV5? Have you up dated LOAs for RNAV5?	**SI**		**OG**		**NO**	**NO**			**OG**	**SI**			**OG**		**PAN**: se trabaja para obtener los datos./Work is being carried out to obtain data.
¿Está en contacto con las autoridades militares nacionales con relación a las operaciones RNAV5? Are you liaising with State military authorities regarding RNAV5 operations?	**SI**		**SI**		**SI**	**NO**			**NO**	**OG**			**SI**		**PAN**: los militares no tienen esa Capacidad/military aviation does not have that capacity.
¿Se ha publicado o tiene planes para publicar el *Trigger* NOTAM Has the Trigger NOTAM been published or do you have plans to publish it?	**SI**		**NO**		**SI**	**NO**			**SI**	**OG**	**NO**		**SI**		

Instrucciones para el llenado del formulario - Instructions to fill in the form

- Cumplida: colocar **Sí** en el casillero correspondiente. / Accomplished: place **YES** in the corresponding box
- En ejecución: colocar **O/G** (on going) e indicar en "observaciones" la fecha prevista de término./ In execution: place **O/G** (on going) and indicate under "remarks" the estimated deadline
- No cumplida: colocar **NO** en el casillero correspondiente y, de ser el caso, hacer comentarios en columna de observaciones/ Not complied: place **NO** in the corresponding box and if such were the case, make comments in the remarks column

APPENDIX I

INTERNATIONAL CIVIL AVIATION ORGANIZATION

SOUTH AMERICAN REGIONAL OFFICE

SAFETY PLAN FOR THE IMPLEMENTATION OF RNAV 5 IN THE SAM REGION

Version 0.3

August 2010

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EXECUTIVE SUMMARY

1 The PBN Roadmap provides adequate guidance to air navigation service providers, operators, airspace users, regulating agencies and international organisations concerning the evolution of navigation, as one of the essential systems that support air traffic management, listing the RNAV and RNP navigation specifications that need to be implemented in the short and medium term in the SAM Region.

2 This PBN Roadmap was developed by CAR/SAM States and International Organisations, together with other International Organisations concerned (IATA, IFALPA, IFATCA), and is aimed at helping the main actors of the aviation community to plan the future transition and their investment strategies.

3 Especially for the SAM Region, this planning has been the basic material for the development of a broader navigation strategy that will serve as guidance for regional air navigation infrastructure implementation projects and for the drafting of national implementation plans.

4 As a result of this planning, the ICAO South American (SAM) Regional Office, with the support of Regional Project RLA/06/901, scheduled a workshop for assessing the risks of the system prior to the implementation of RNAV 5 and the optimisation of the SAM ATS route network.

5 This workshop was attended by experts in the various areas of knowledge as well as by civil aviation authorities, air traffic service providers, pilots, operations and airworthiness inspectors, IATA and the CAR/SAM Regional Monitoring Agency (CARSAMMA). The establishment of this multidisciplinary group of experts permitted the identification of hazards that might affect or hinder optimisation, the assessment of the consequences in terms of likelihood and severity, and the tolerability of operational risks, and defined the mitigating measures required to improve the resulting level of safety.

6 This multidisciplinary team applied the risk management methodology contained in the Safety Management Manual (Doc 9859) concerning Safety Management Systems (SMS). Accordingly, the operational risks identified were assessed, and the seven stages of the operational risk management process were applied to measure safety levels.

7 This safety study for the implementation of RNAV5 starts with a brief description of the system based on the planning defined for the SAM Region and on the PBN Roadmap. The purpose of this study is to determine the feasibility of RNAV5 implementation, based on a risk assessment, using the qualitative methodology described in Doc 9859 to ensure the safety of operations within this new scope of application in the SAM Region.

8 This study revealed that the level of risk for the implementation of RNAV5 in continental airspace of the SAM Region is acceptable. However, it is expected that its implementation will improve safety upon requiring a greater lateral navigation precision, which will permit an orderly transition for the introduction of other navigation specifications and the application of parallel route systems where necessary. Finally, it contains recommendations to the various organisations of the Region, and to aeronautical authorities, operators and ATS systems of the SAM Region. In summary, the implementation of RNAV5 in the continental area of the SAM Region is feasible as shown in this study, based on risk management and the defences defined in this safety study.

Chapter 1: Preamble

1.1 Objective

1.1.1 The purpose of this document is to make a qualitative assessment of the implementation of performance-based navigation and particularly RNAV5 in the SAM Region, based on a safety assessment following the guidelines established in the regional plan, taking into account the Global Air Navigation Plan and the Global Plan Initiatives (GPIs), in order to begin a transition towards the global ATM operational concept.

1.1.2 This plan also seeks to establish an implementation strategy so that the ATM community may derive benefits in the short and medium term, based on the ATM infrastructure and available and foreseen aircraft capabilities, and thus be able to comply with regional planning.

1.1.3 In this sense, the adoption of these actions calls for a standard methodology for the identification of hazards, analysing their consequences and thus permitting the management of the operational risks involved in the implementation of RNAV5. This assessment has been based on the provisions of the Safety Management Manual (Doc 9858, SMM Manual), related to the application of safety management systems, as established in the Manual on Performance-Based Navigation (Doc 9613) for RNAV5 implementation.

1.1.4 Taking into account the diversity of scenarios in the SAM Region and the agreements reached at the various work meetings of the SAM implementation group, it was felt that this type of safety study would be a complex task and that it should be supported by Regional Project RLA/06/901.

Airspace improvements contribute directly to the achievement of the following ICAO Strategic Objectives:

- Safety — *Enhance global civil aviation safety*
- Environmental protection — *Minimise the adverse effect of global civil aviation on the environment*
- Efficiency — *Enhance the efficiency of aviation operations*

1.2 Scope

1.2.1 The safety assessment for RNAV5 implementation covers the whole SAM Region. The FIRs involved are the following: Antofagasta, Amazónica, Asunción, Barranquilla, Brasilia, Bogota, Comodoro Rivadavia, Córdoba, Curitiba, Ezeiza, Georgetown, Guayaquil, La Paz, Lima, Maiquetía, Mendoza, Montevideo, Panama, Paramaribo, Puerto Montt, Punta Arenas, Recife, Resistencia, Rochambeau and Santiago.

1.3 Background

1.3.1 The Global ATM Operational Concept was approved at the Eleventh Air Navigation Conference, and published as Doc 9854 AN/458, through Recommendation 1/1, which states the following:

a) ICAO, States and the planning and implementation regional groups (PIRGs), consider the global ATM operational concept as the common global framework to guide planning for implementation of ATM systems and to focus all ATM development work;

b) The global ATM operational concept be used as guidance for development of ICAO CNS/ATM related provisions;

c) States with the support of other members of the ATM community undertake work to validate the seven components in the global ATM operational concept;

d) ICAO, States and PIRGs develop transition strategies for implementation of ATM systems based on the global ATM operational concept; and

e) ICAO align its technical work programme to facilitate future work related to the global ATM operational concept.

1.3.2 Following the AN-Conf/11, the Sixth Meeting of ANC Consultation with Industry was held with the theme "promoting the implementation of the recommendations of the 11th Air Navigation Conference". The topics discussed included "Global ATM - From Concept to Reality", which generated the following conclusion:

> "That those partners who are in a position to do so, work together toward the development of a common roadmap/global action plan, aimed at attaining operational benefits in the near to medium term and that such a document should be made available to ICAO by mid October 2004, for presentation to the Air Navigation Commission and consideration for inclusion in the Global Plan."

1.3.3 In order to align global planning with the conclusions of the Eleventh Air Navigation Conference, mainly in relation to the Global ATM Operational Concept, as well as to the Industry Roadmap, ICAO began the development of the new Global Air Navigation Plan. In addition to including the Global ATM Operational Concept, the Global Air Navigation Plan focuses on a set of "Global Plan Initiatives (GPIs), providing the necessary conditions for the implementations aimed at attaining benefits for the ATM community in the near and medium term.

1.3.4 In this respect, and at the request of the States and International Organisations, the ICAO regular programme in the South American Region, amongst other implementation projects, has focused on the optimisation of the airspace through the implementation of RNAV5 and the optimisation of the airspace structure. The meetings of the SAM Implementation Group (SAM/IG), where both implementation programmes are being executed, are being held under the auspices of the new project RLA/06/901. This will permit an inter-functional air traffic management system for all users during all flight phases, and that complies with the agreed safety levels--which is the purpose of this study--, provides economically optimum operations, is environmentally sustainable, and meets national security requirements.

Chapter 2 Description of the Air Traffic System in the SAM Region

2.1 General status of the SAM ATS system

2.1.1 Since the year 2000, the Region has been introducing improvements to the airspace structure through the implementation of RNAV routes, the realignment of routes and the elimination of some conventional routes. These RNAV routes, in general terms, have allowed most flights to operate direct routes, or routes that are as close as possible to direct routes, between the origin/destination airports. However, the States and International Organizations of the Region felt that, in order to further improve airspace structure and attain operational improvements as early as possible, performance-based navigation should be implemented in the Region.

2.1.2 The current ATS system has several sub-systems: Airspace Management (ASM), Air Traffic Services (ATS), and Air Traffic Flow Management (ATFM). ATS services are provided in all the flight information regions of the Region, and the upper airspace has an ATS RNAV route network with no navigation specification and conventional routes. RNAV10 is applied in selected parts of the oceanic airspace.

2.1.3 The longitudinal separation between aircraft, applicable by adjacent control centres, is normally 10 minutes, unless, for some particular reason, 5 additional minutes need to be added to that separation. Since the year 2005, the vertical separation above FL 290 and up to FL 410 is 1000 ft, this being an exclusionary airspace where non-RVSM aircraft are not allowed to operate.

2.1.4 Surveillance systems have a partial coverage in the Region, and there are still areas where only VHF or HF communications, as applicable, are available for the provision of air traffic services. Fixed communication services between ACCs are satisfactory.

2.1.5 According to the analysis made when planning RNAV implementation, 95% of the fleet operating in the Region is potentially ready to be approved for flying in RNAV5 airspace. Although the fleet has improved substantially in the last few years, part of it is still old generation.

2.1.6 Likewise, aeronautical meteorology services and aeronautical information services that meet the standards established in the corresponding ICAO Annexes are provided. Furthremore, all the States of the Region provide search and rescue services.

2.1.7 The Regional Implementation Concept defined by GREPECAS is based on the improvement of ATM in the CAR/SAM Regions and the requirements it generates in terms of communications, navigation and surveillance. ATM improvements have been defined according to the main international traffic flows identified in the homogeneous areas.

2.1.8 The main traffic flows are currently served by domestic and international RNAV routes. However, aircraft operators continue requesting new RNAV routes, which must be assessed from the point of view of their application, in order to give priority to the main air traffic flows. It is important to note that the composition and combination of RNAV and non-RNAV routes add complexity to the airspace and prevent a better management of air traffic in the SAM Region.

2.1.9 The ground communication, navigation (VOR, DME) and surveillance infrastructure is fundamental for RNAV5, both to enable the application of that navigation specification and to ensure the navigation reversal mode in case of loss of the GNSS signal, taking into account that:

a) The minimum level of availability and integrity required may be achieved by installing a single RNAV system, made up by one or more sensors, an RNAV computer, a control display unit, and a navigation display (HSI, CDI, etc.). This is acceptable if the crew monitors the system and if, during the occurrence of a system failure, the aircraft is capable of navigating using ground-based navigation systems (VOR, DME). Thus, aircraft must fly within the service volume of one of the ground-based navigation systems in order to permit navigation reversal to a "conventional" system if so needed to preserve safety.

b) Since it is an RNAV specification that does not require on-board performance monitoring and alert systems, the use of ATS surveillance may mitigate the requirement for a greater spacing between routes, so as to overcome any navigation system failure that goes undetected by the flight crew.

c) Direct controller-pilot communications are also a fundamental requirement for RNAV5 implementation, taking into account that, for the reasons explained in "a" and "b" above, reversal to another navigation system and/or the observation by the controller of a deviation of the aircraft from the expected path will require immediate controller-pilot contact.

2.1.10 Based on the above, the SAM Region agreed to implement RNAV5 by 18 November 2010, subject to the final decision to be adopted in October 2010 during the Sixth Meeting of the SAM Implementation Group (SAM/IG/6). One of the aspects to be taken into account when making the decision will be this safety plan.

Chapter 3: Hazard Identification Process for RNAV5 Implementation

3.1 Introduction

3.1.1 For purposes of the identification of hazards in the area of RNAV5 operations, a regional workshop (SAMRA/1) was organised with the participation of a multidisciplinary group of experts. This multidisciplinary group identified the hazards and their associated consequences within the scope of RNAV5 implementation and finally determined their level of operational risk to validate RNAV5 implementation.

3.1.2. For purposes of the analysis in this chapter, hazards will be defined as factors that could affect the acceptable level of safety (ALoS); for example, the modification or realignment of an airway and the implementation of RNAV5. Consequently, this new scenario entails generic hazards of a natural, technical or economic nature. The occurrence of a hazard generates consequences that affect all operational areas, such as: technical aspects, loss of separation, increased workload of services, and others. In the case of natural hazards, such as severe turbulence or volcanic ash, the damage to aeroplane components is immediate. Another aspect to consider is the degradation of communication systems, which affects the integrity of the ATM system. With a common understanding of the relationship between hazards and theirs consequences, we can move to the next stage, which involves operational risk management, as described in Chapter 4 of this document.

3.2. Analysis of the safety assessment process (hazard identification)

3.2.1 For the safety assessment process, the guidelines contained in Doc 9859, SMS Manual, have been followed. The different activities are listed in chronological order, systematically ordering the actions that will permit the identification of hazards as follows:

Step 1:	Drafting (or obtention) of a full description of the system to be assessed and the environment in which the system will operate (developed in detail in Chapter 2)
Step 2:	Identification of hazards and their consequences
Step 3:	Risk assessment, expressed in terms of likelihood
Step 4:	Risk assessment, expressed in terms of severity
Step 5:	Risk index/tolerability
Step 6:	Risk mitigation
Step 7:	Drafting of the safety assessment documents

3.2.2 The diagram below shows the safety assessment process and the possible need to repeat the process cycle until finding a satisfactory method for the identification of hazards and associate their consequences.

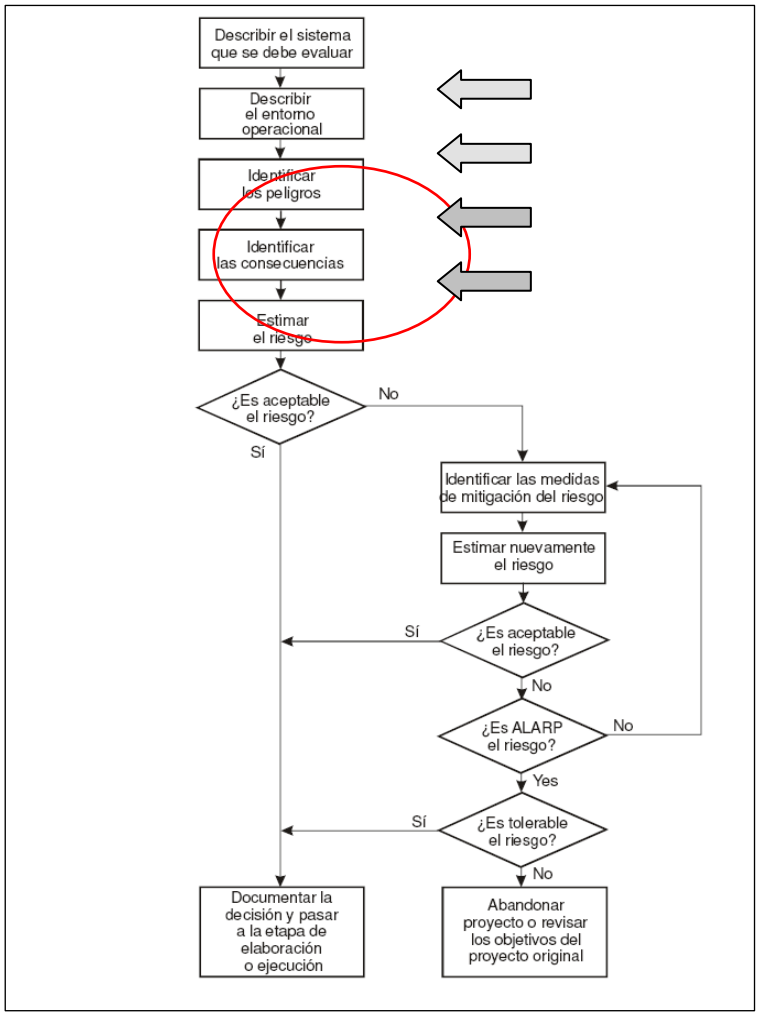


Figure 1. Hazard identification process (Doc 9859 - SMS)

3.2.3 The safety repercussions of a possible loss or degradation of the system will determine, in part, the characteristics of the operational environment in which the new scenario or implemented system will be integrated. Therefore, the description of such environment included all the factors that could have a significant effect on safety. These factors will vary from case to case and could include, for instance, the specific characteristics of the air traffic system, the airport infrastructure, and weather-related factors.

3.2.4 The description of the regional system includes the contingency procedures and other non-ordinary operations, such as the various types of deficiencies or failures in communications or navigation aids. For large projects like this one, the description of the system must include the strategy and planning for the transition from the old system to the new foreseen scenario.

3.3. Hazard identification methodology for RNAV5 implementation

3.3.1 The hazard identification process was carried out in a multidisciplinary and integrated manner in the Region, within the framework of the SAMRA/1 workshop. A series of sessions were scheduled for the identification of hazards, based on a structured approach, ensuring, to the extent possible, the identification of all potential hazards using a structured, multidisciplinary approach that included the following aspects:

a) Checklists. Review the experience and available data on accidents, incidents or similar systems, and prepare a hazard checklist. Aspects that present a possibility or risk will require a more in-depth assessment.

b) Work teams were formed to review the hazard checklists, generating ideas on hazards and analysing potential scenarios in detail.

c) Representatives accredited by each State of the Region, with knowledge of the relevant areas of the RNAV5 project, participated in the workshop. The range of knowledge was broad to make sure that all the aspects of the RNAV5 system were addressed. However, it should also be noted that each team shared its operational experience, which facilitated a qualitative analysis.

d) During this stage, work was done in plenary sessions, with the participation of all the participants of the workshop, who agreed to, and validated, each of the hazards and the associated consequences. This was recorded in a document for the "safety library" of the Region.

3.3.2 For the identification of hazards, all possible alternatives were analysed, from the least likely to the most likely scenario, duly considering the "worst" conditions or context. It is also important to note that the hazards identified by this team of experts had to be "credible" and consistent with the operational context and experience of all the participants.

3.3.3 An important point to note is that sometimes it is difficult to draw the difference between a credible worst-case scenario and one that relies so much on coincidence or assumptions that should not be taken into account. To decide on this issue, the following criteria were applied:

- Worst-case scenario: The most unfavourable conditions are foreseen; for example, extremely high traffic levels, disturbance due to extreme weather conditions.

- Most likely or credible scenario: This assumes not exaggerating or expecting a combination of extreme conditions during the operational life cycle of the system.

- This type of assessment should always analyse the most critical phase of flight in which the aircraft could be affected by failure of a system, taking into account certain type of failures, although in general it was not necessary to assume that all failures would occur at the same time. However, the group identified all common or recurrent failures occurring when a single (trigger) event initiates a multiple cause and makes the system collapse.

3.3.4 Upon concluding its discussions, the SAMRA/1 workshop recorded the hazards, describing each of them, as agreed upon and validated by the group of experts. Likewise, it recorded their associated consequences, together with the assessment of their likelihood and severity. This activity permitted an objective risk management and the definition of the necessary mitigation measures, which will be later described. This list was updated whenever new hazards were identified and new scenarios emerged, which called for an analysis of the required mitigation measures. All the background information gathered during the SAMRA workshop was recorded in the table that summarises the different plenary sessions.

3.4 Analysis of the consequences of hazards in the RNAV5 route network

3.4.1. Based on the hazards agreed upon and recorded and the associated consequences identified for each of them, the task of determining the severity of each of these consequences began. With this information, the workshop proceeded to the next stage, applying risk management in terms of the likelihood and severity of the events described, with a view to the classification of risks according to the Management Triangle.

3.4.2 Once the severity of all the hazards identified was assessed, the results were recorded in the table of hazards, including the justification of the analysis, concerning the identification of hazards and operational risks, as agreed for RNAV5 at the SAMRA workshop. The table contains a summary of the identification of hazards and their associated consequences, leading to the next stage described in Chapter 4, and begin the safety assessment for RNAV5 implementation.

3.5 Identification of hazards in RNAV5 implementation

3.5.1 During the hazard identification stage, all possible sources of system failure were analysed. Depending on the nature and size of the system analysed, the sources were as follows:

a) Equipment (software and hardware);
b) Operational environment (*e.g.*, physical conditions, airspace, route design);
c) Human operators;
d) Human-machine interface;
e) Operational procedures;
f) Maintenance procedures;
g) External services; and
h) Others

3.5.2 The experts participating at the 2010 SAMRA workshop followed this hazard identification process, applying the techniques defined in the theory of PhD. James Reason (Doc 9859) to determine the importance of latent or underlying conditions in the system, since latent conditions are not easily manifest and are only evident when an undesired event occurs. That is why this process specifically sought to answer

questions such as: "how could the personnel misinterpret this procedure?" or "how could a person misuse this new function or this new system (intentionally or not) within the scope of RNAV5 implementation?"

3.5.2 The validation and registration of the identified hazards were defined in plenary session and will be described more specifically later. The respective consequences were also assigned in order to proceed to the next stage, involving the assessment of the likelihood and severity and the subsequent adoption of the required mitigation measures. This registration process is a fundamental part of this safety assessment document, since it summarises the actions assessed. It is also part of the safety management concept identified as the "*technical library*", for future verification of the assumptions used in operational risk management, as specified in Doc 9858, SMM. This registry must be updated as new hazards are identified and new proposals are submitted in the Region, serving as a baseline for subsequent analyses. The figure below shows the safety information flow and the establishment of the safety library as a validated registry for an efficient management of the methods used for safety assessment.

Fig. Safety library - Doc 9859, SMS Manual

3.6 Description of the hazards analysed by the group of experts of SAMRA/1 (Summary table - Hazard identification for RNAV5)

3.6.1 The group of experts of the SAMRA/1 workshop determined the first four fields of the hazard identification table, according to the work proposal. In this respect, it defined the different activities of the work groups, which permitted a definition of the nature of the hazards: technical, natural or economic. Likewise, the specific hazards were defined and assigned to the different analytical scenarios. Subsequently, the consequences of each hazard were identified and the results recorded in the corresponding table. The hazards defined for this study are listed in the next item.

3.6.2 For the identification of hazards related to the type of activity, the experts highlighted three basic areas, namely:

- Aircraft operations on RNAV5 routes
- Regulatory and organisational issues
- Coordination issues

3.6.3 The hazards identified were recorded in the hazard and operational risk identification table of the SAMRA/1 workshop, as follows:

- Operations in RNAV5 airspace with non-RNAV5 aircraft
- Operations with degraded on-board equipment, which affects the navigation capability under the RNAV5 specification.
- Lack of navaid coverage in the SAM Region.
- Operations on routes affected by volcanic ash, based on recent experience in the control centres of Ecuador and Chile.
- Operations in areas with strong turbulence caused by mountain wave, the Andes mountain range, or clear air turbulence (CAT).
- Failure to publish contingency management procedures in case of loss of the capacity to operate on RNAV5 routes.
- Outdated operator’s operating manuals, which generate situations that affect safety.
- Outdated ANSP operating manuals, which altogether affects the safety levels in the SAM Region.
- ATC-to-ATC oordination
- Civil-military coordination
- Use of unmanned aircraft (UAV) in RNAV5 areas without prior coordination.

3.6.4 With respect to the definition of the consequences associated to hazards, the group of experts identified the following possible occurrence scenarios:

- For hazards derived from aircraft operations on RNAV5 routes, these were divided into two large groups, the common denominator for technical hazards being the operations in RNAV5 airspace with non-RNAV5 aircraft. Another relevant aspect was the degradation of the capacity to operate in an RNAV5 environment. Finally, note was made of the lack of navaid coverage, which could prevent the reversal to conventional systems in case of degradation of the on-board GNSS or autonomous navigation systems. These aspects were associated to a consequence of the following type:

  - **Loss of aircraft separation**

- Natural hazards, such as volcanic ash resulting from unexpected eruptions, and severe turbulence on RNAV5 routes. The associated consequence was identified as:

  - **Increased ATC workload**

- With respect to regulations for operating under RNAV5 criteria, the group identified the lack of contingency procedures in case of loss of the capacity to operate on RNAV5 routes, lack of RNAV5 operations manuals validated by the aeronautical authorities, and outdated operators' manuals. Another important aspect was the inaccuracy of ANSP operations manuals, which affects interaction between States, authorities and operators. Consequently, the lack of updated regulations had the following potential consequence on the regional system:

  - **Lack of vertical and lateral separation**

- Finally, a relevant aspect identified by this regional group of experts was the effect of failures resulting from lack of ACC-to-ACC and civil-military coordination. This generic hazard could result in the incursion of unauthorised aircraft in RNAV5 routes. The group included here the unmanned aircraft (UAV) previously defined in this document. For this scenario, the following consequence on the RNAV5 route system was identified:

  - **Loss of separation**

3.7 Conclusions of the identification of hazards and consequences for RNAV5

3.7.1 Based on the identification of the specific hazards described and their related consequences, it was determined that the loss of separation between aircraft was a recurrent hazard, in addition to increased ATC workload and coordination failures between control centres, and their consequences are quite significant. This leads to the next stage, which completes the safety assessment process required for the implementation of RNAV5. This activity will be analysed in detail in the next chapter.

Chapter 4: Operational Risk Management Process for RNAV5 implementation

4.1 Introduction

4.1.1 In this stage, the background information defined at the SAMRA/1 workshop will be analysed, including the identification of hazards and their consequences, as defined in the previous chapter. After the group of experts of the SAM Region validates this information, the methodology for determining the operational risk level, described in the seven-step process, will be applied, following the data processing required in the SMM (Doc 9859).

4.1.2 This stage of the analysis will depend on two variables defined as: the ***likelihood*** of occurrence of an event, and the worst-case scenario, known as the ***severity*** of an event. A qualitative analysis is conducted and, finally, operational risk matrices are used, determining what additional actions can be agreed by the group of experts and applied in order to minimise or effectively contain the operational risks in the implementation of RNAV5.

4.1.3 For purposes of standardising the concepts used, risk will be defined as the assessment of the consequences of a hazard, expressed in terms of ***likelihood*** and ***severity***, based on the worst condition or worst-case scenario foreseen. Accordingly, once the hazards and their associated consequences have been defined, based on a given value determined by the likelihood of occurrence of an event and its severity, the matrices defined in the SMM will be used, according to the following formula:

$$\textbf{Hazard – Consequences} = f\left[\textbf{P* S}\right]$$

where:

P= likelihood

S= severity of an event

4.1.4 Accordingly, in this type of analysis, the following steps of the risk assessment process will be completed:

3rd step: Risk assessment, expressed in terms of **likelihood**

4th step: Risk assessment, expressed in terms of **severity**

5th step: **Risk index/tolerability**

6th step: **Risk mitigation**

4.1.5 In order to estimate the ***likelihood*** of occurrence of an event, an approach similar to the one adopted in the second step is applied. The likelihood will be specified by qualitative category, but certain numeric values will also be assigned to determine the likelihood related to each condition. Some of the events analysed in this study contained data that was used for doing the direct numerical estimates of the likelihood of failure.

4.1.6 The estimate of the likelihood of occurrence of hazardous events related to human errors will generally involve a degree of subjectiveness, and it should be borne in mind that, even when assessing

hardware, there is always the possibility of failure due to human error like, for example, incorrect equipment maintenance procedures.

4.2 Aspects taken into account for determining the likelihood in RNAV5 implementation

4.2.1 The term "likelihood of an event" is defined as *the possibility that an event or unsafe condition may occur*. For this stage of the study, the matrix contained in the SMM and defined by ICAO as a global risk management analytical tool will be used, as shown below.

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	**5**
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	**4**
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	**3**
Improbable	Muy improbable que ocurra (no se sabe que haya ocurrido)	**2**
Extremadamente Improbable	Casi inconcebible que el suceso ocurra	**1**

4.2.2 Another aspect that must be included in this discussion is the origin of the various values defined for this quantitative analysis. This matrix is based on operational experience worldwide and on the likelihood defined for each occurrence as follows:

- Frequent: 1 to 10^{-3} per hour of flight
- Occasional: 10^{-3} to 10^{-5} per hour of flight
- Remote: 10^{-5} to 10^{-7} per hour of flight
- Unlikely: 10^{-7} to 10^{-9} per hour of flight
- Extremely unlikely: + 10^{-9} per hour of flight

4.2.3 The analysis of the conclusions of the group of experts at the SAMRA/1 workshop (**Appendix 1 to Chapter 4**) shows that hazards and their consequences were defined based on operations with non-RNAV5 aircraft, the degradation of on-board navigation capabilities to fly on RNAV5 routes in the SAM Region, and lack of navaid coverage. The general consequence of these hazards was the loss of separation. The matrix of likelihood of occurrence gives a value of "remote", meaning unlikely to occur. According to operational experience, this has rarely occurred but is likely to occur or occur again**.**

Remote, equivalent to a value of "3"

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	**5**
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	**4**
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	**3**

4.2.4 With respect to the previous analysis, the defences that exist in this operational scenario are the following: collision avoidance system (ACAS), ATC services, ATS route network in the SAM Region, existing regulation for RNAV operations, and use of contingency procedures.

4.2.5 Regarding natural hazards, the operation in areas with volcanic ash that could affect air navigation was identified, together with the operation in areas with severe turbulence. This hazard could reduce the availability of the route network and, consequently, increase ATC workload on selected routes not affected by volcanic ash or severe turbulence. According to this analysis, the level of likelihood was defined as "occasional", with a value of 4, based on the matrix indicator. According to the technical bibliography, this type of event has occurred infrequently in the Region.

Occasional, equivalent to a value of "4"

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	**5**
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	**4**
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	**3**

4.2.6 The defences existing in the system were defined as follows: existence of specific contingency procedures for each natural event (volcanic ash and turbulence), a system for notifying the crew through the control centres, issuance of NOTAMs.

4.2.7 Regarding regulatory hazards, the group identified the lack of publications and contingency procedures in case of loss of RNAV5 capacity, outdated operating manuals of the operators and ANSPs, all of which result in a loss of separation. Based on this information, and as in the previous case, it was concluded that hazards should be classified as occasional, since this type of event has occurred infrequently in the Region, and was assigned an index of 4.

Occasional, equivalent to a value of "4"

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	5
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	4
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	3

4.2.8 The defences existing in the system were defined as follows: a sound network of radio navigation aids, use of collision avoidance systems (ACAS), ATC services, an adequate ATS route network consistent with current requirements, approval of aircraft and operators for RNAV5 operations, and the use of safety oversight systems. Finally, it was noted that the implementation of proactive strategies based on audits and inspections is an effective defence in the current scenario.

4.2.9 Regarding the analysis of hazards resulting from coordination failures, the operational errors identified were related to ACC-to-ACC and civil-military coordination, which could potentially result in the incursion of unauthorised aircraft in RNAV5 routes and, consequently, loss of separation.

Occasional, equivalent to a value of "4"

	Significado	Valor
Frecuente	Probable que ocurra muchas veces (ha ocurrido con frecuencia)	5
Ocasional	Probable que ocurra algunas veces (ha ocurrido infrecuentemente)	4
Remoto	Improbable, pero posible que ocurra (ha ocurrido raramente)	3

4.2.10 The defences existing in the system were identified as follows: appropriate regulation, publication of restricted areas, NOTAMs, ATC services, appropriate means of coordination between control centres, and letters of operational agreement (LOAs). Despite existing measures, the likelihood of an event was identified as occasional. However, the experts highlighted that this was a latent condition in the control centres of the SAM Region, deserving further action by the States and ATSP, and a more systematic and continuous follow-up through the Scrutiny Group and the Regional Monitoring Agency (CARSAMMA).

4.3 Aspects taken into account for determining the severity in RNAV5 implementation

4.3.1 The term severity is defined as the possible effect of an event or unsafe condition, taking as a reference the worst condition or worst-case scenario. It is important to note that this phase corresponds to the fourth step of the operational risk assessment process, in which the likelihood of an event and its relationship with the worst-case scenario is defined, and which represents the essence of operational risk management.

4.3.2 According to the risk management process, once the likelihood of the risks of a given event or unsafe condition (analysed in the previous item) has been assessed, the next stage in this sequence is the assessment of the severity of the consequences of the hazard. Therefore, it is important to analyse whether, in case of occurrence, it would be detrimental for RNAV5 operations. All the consequences identified in the previous chapters are analysed in this stage, under the perspective of the worst-case scenario.

4.3.3 In order to determine this important function in operational risk management, the matrix defined in the SMM for operational risk management, as shown below, was used. This will help determine the **severity** of the different scenarios analysed. The following figure shows the matrix used for this analysis.

Gravedad del suceso	Significado	Valor
Catastrófico	— Destrucción de equipo — Muertes múltiples	**A**
Peligroso	— Reducción importante de los márgenes de seguridad, daño físico o una carga de trabajo tal que los operarios no pueden desempeñar sus tareas en forma precisa y completa — Lesiones graves — Daños mayores al equipo	**B**
Mayor	— Reducción significativa de los márgenes de seguridad, reducción en la habilidad del operador en responder a condiciones operacionales adversas como resultado del incremento de la carga de trabajo, o como resultado de condiciones que impiden su eficiencia — Incidente grave — Lesiones a las personas	**C**
Menor	— Interferencia — Limitaciones operacionales — Uso de procedimientos de emergencia — Incidentes menores	**D**
Insignificante	— Consecuencias leves	**E**

4.3.4 Although the assessment of the severity of the consequences of a hazard will always have some degree of subjectiveness, this is offset by discussions in duly qualified and multidisciplinary groups made up by members duly qualified in their respective specialties. For this reason, the SAMRA/1 workshop helped clarify all the issues affecting the SAM Region.

4.3.5 According to the risk assessment process, once the severity of all the hazards identified has been assessed, and the results classified, the results must be recorded in the hazard and risk table.

4.3.6 Based on the analyisis of the severity assigned to each of the hazards identified by the work team, the following may be noted: in the case of aircraft not approved for operations on RNAV5 routes or with degraded on-board RNAV5 navigation capabilities, an with lack of radio aid coverage, it was determined that the worst-case scenario would be "major", which means a significant reduction in safety margins, a reduced ability of the operator to respond to adverse operating conditions, resulting in an increased workload or reduced efficiency, and the possibility of causing injury to individuals, or a serious incident. Accordingly, the value assigned to this scenario was "C", as shown in the following picture:

Severity is defined as major, equivalent to "C"

Gravedad del suceso	Significado	Valor
Catastrófico	— Destrucción de equipo — Muertes múltiples	**A**
Peligroso	— Reducción importante de los márgenes de seguridad, daño físico o una carga de trabajo tal que los operarios no pueden desempeñar sus tareas en forma precisa y completa — Lesiones graves — Daños mayores al equipo	**B**
Mayor	— Reducción significativa de los márgenes de seguridad, reducción en la habilidad del operador en responder a condiciones operacionales adversas como resultado del incremento de la carga de trabajo, o como resultado de condiciones que impiden su eficiencia — Incidente grave — Lesiones a las personas	**C**

4.3.7 For the analysis of natural hazards resulting from volcanic ash and operations in areas with severe turbulence, it was determined that these values were similar to those of the previous case, with a severity index of **"**major". Based on this, the value assigned to this scenario was "C", as shown in the following figure:

Severity classified as major, equivalent to a value of "C"

Gravedad del suceso	Significado	Valor
Catastrófico	— Destrucción de equipo — Muertes múltiples	**A**
Peligroso	— Reducción importante de los márgenes de seguridad, daño físico o una carga de trabajo tal que los operarios no pueden desempeñar sus tareas en forma precisa y completa — Lesiones graves — Daños mayores al equipo	**B**
Mayor	— Reducción significativa de los márgenes de seguridad, reducción en la habilidad del operador en responder a condiciones operacionales adversas como resultado del incremento de la carga de trabajo, o como resultado de condiciones que impiden su eficiencia — Incidente grave — Lesiones a las personas	**C**

4.3.8 For the hazard resulting from lack of publication of contingency procedures in case of loss of RNAV5 capability, absence of operator's and ANSP manuals, outdated manuals, improper use of procedures, the consequence identified was the loss of separation. The most critical scenario in the severity matrix is defined as "major". Based on this, the value assigned to this scenario was "C", as shown in the following figure:

Severity defined as major, equivalent to a value of "C"

Gravedad del suceso	Significado	Valor
Catastrófico	— Destrucción de equipo — Muertes múltiples	**A**
Peligroso	— Reducción importante de los márgenes de seguridad, daño físico o una carga de trabajo tal que los operarios no pueden desempeñar sus tareas en forma precisa y completa — Lesiones graves — Daños mayores al equipo	**B**
Mayor	— Reducción significativa de los márgenes de seguridad, reducción en la habilidad del operador en responder a condiciones operacionales adversas como resultado del incremento de la carga de trabajo, o como resultado de condiciones que impiden su eficiencia — Incidente grave — Lesiones a las personas	**C**

4.3.9 In the case of the coordination hazard resulting from failure in the coordination between control centres, the potential consequence would be the incursion of unauthorised aircraft in RNAV5 airspace, generating a possible loss of separation. The SAMRA/1 workshop defined this scenario as "hazardous", which, in this context, means that there could be a significant reduction in safety margins, physical damage or a workload such that the parties involved, whether pilots or controllers, would not be able to perform their tasks in a precise and complete manner. It would also cause serious injuries and major damage to the

equipment, resulting in a value of "B". Based on the risk indicators analysed in this document, the final result for these consequences is the highest severity index of all the hazards identified.

Severity defined as hazardous, equivalent to a value of "A"

Gravedad del suceso	Significado	Valor
Catastrófico	— Destrucción de equipo — Muertes múltiples	**A**
Peligroso	— Reducción importante de los márgenes de seguridad, daño físico o una carga de trabajo tal que los operarios no pueden desempeñar sus tareas en forma precisa y completa — Lesiones graves — Daños mayores al equipo	**B**
Mayor	— Reducción significativa de los márgenes de seguridad, reducción en la habilidad del operador en responder a condiciones operacionales adversas como resultado del incremento de la carga de trabajo, o como resultado de condiciones que impiden su eficiencia — Incidente grave — Lesiones a las personas	**C**

4.3.10 For the hazard identified as civil-military coordination, the result of failures in coordination between civil and military authorities was analysed, with the potential consequence of the incursion of unauthorised aircraft in restricted or prohibited airspaces, thus causing loss of separation. When addressing this issue, the work team took into account operations with unmanned aircraft (UAV). Some States highlighted this scenario, expressing their concern over the increasing number of this type of operations, since in some cases, they are carried out with no real control or coordination by the parties involved.

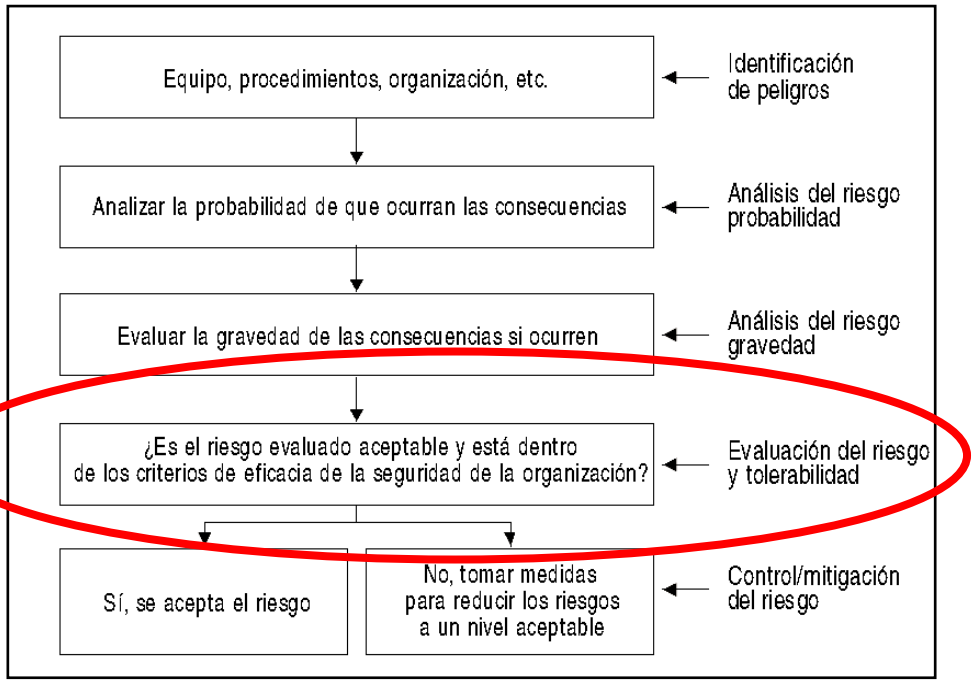
4.3.11 They also mentioned, as an aspect to be taken into account, the capacity of these aircraft to fly and operate above FL290. Therefore, this new foreseeable scenario can be classified as hazardous for the implementation of RNAV5, and would cause a significant reduction in safety margins, both because of the resulting physical damage or workload, and because of the possibility of causing serious injury and major damage to the equipment.

4.3.12 The analysis of the severity matrix resulted in a value equivalent to "hazardous". This type of scenario or potential condition is increasingly feasible in the SAM Region and requires concrete action to mitigate this new hazard, as reflected in the safety recommendations of this document.

Chapter 5 Operational Risk Assessment and Mitigation for RNAV5 Implementation

5.1 Introduction

5.1.1 Up to this stage, the potential hazards and their related consequences have been identified, based on the background information analysed in the previous paragraphs and following the risk management methodology. Then, the operational risk management was reviewed and, based on the likelihood of occurrence and severity, and taking into account the worst-case scenario, the acceptable levels of operational risk were defined, according to the various matrices for measuring risk levels and their respective tolerability index related to the applicable additional defences. In sum, the general concept has been to reduce the operational risk to an acceptable level (ALoS), from a realistic perspective that is consistent with our development.



5.2 Operational risk mitigation criteria

5.2.1 The acceptability of a risk will depend on the defences analysed in the proposed scenario. In the case of RNAV5, the defences existing in the SAM Region were identified and then the acceptability criteria were applied from a two-dimensional perspective. Acceptability is generally based on the severity matrix of an event and the likelihood of its occurrence. The "management triangle" was used to determine the risk assessment criteria, and the risk indices or values defined as non-tolerable and unacceptable under the existing circumstances in the Region were managed or controlled, as shown in the table below:

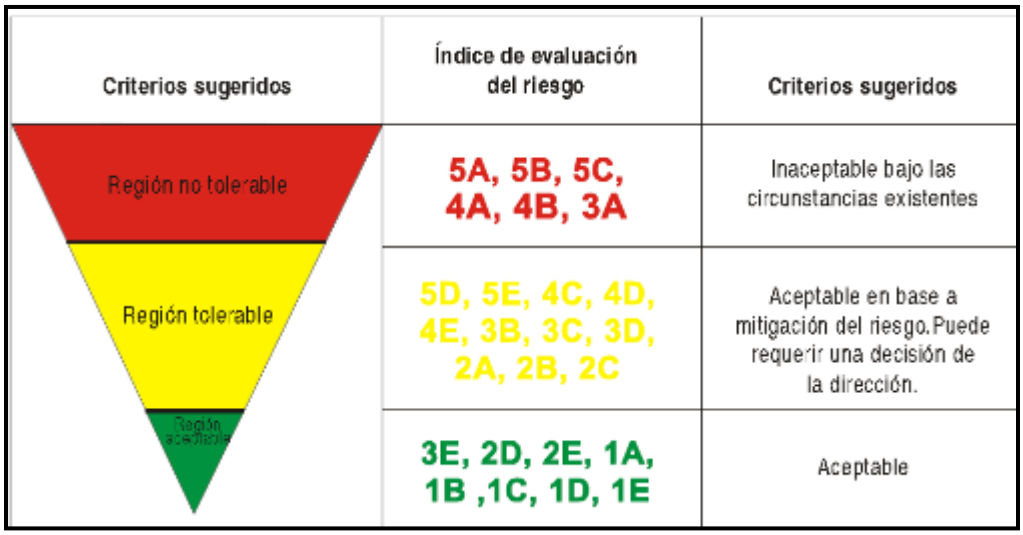


Table of operational risk mitigation criteria

5.2.2 In relation to the tolerable risk concept, there is a area between the acceptable and the unacceptable risk in which the decision as to the acceptability is not clear or determinant. These latter risks belong to a category in which risk may be tolerable if reduced to a level as low as reasonably possible (ALARP). When a risk is classified as ALARP, an attempt should always be made to implement additional mitigation measures that are deemed feasible for the SAM Region. In the case of risks that fall in the intermediate area of the management triangle (shown below), they are defined as acceptable, based on risk mitigation. These risk levels may require a decision by management. Risks in this category are not classified rashly as tolerable. Each case must be examined individually, as stated in the previous chapters, taking into account the benefits and costs derived from the implementation of the proposed changes.

5.2.3 Regarding the above, when risks do not meet the acceptability criteria predetermined in the chart above, an attempt should always be made to reduce them to an acceptable level and, if this is not possible, to a level as low as reasonably possible (ALARP), using the mitigation procedures or the so-called additional defences that will be later described. The identification of the appropriate risk mitigation measures requires a good understanding of the hazards identified in Chapters 3 and 4 in relation to the factors that contribute to the occurrence of an event of these characteristics, since any effective mechanism for reducing the risk will have to modify one or more of these factors in order to achieve a reduction to an acceptable level.

5.2.4 Risk mitigation measures can have the effect of reducing the likelihood of occurrence of an event or the severity of the consequences, or a combination of both. The challenge will be to reduce the operational risk to a desired level, for which more than one mitigation measure may be required. In this particular case, the safety assessment has considered the following possible measures to mitigate the operational risks:

a) Revision of the system design;
b) Modification of operational procedures;
c) Organisational changes;
d) Training as required; and
d) Use of information and communication technologies.

5.3 Description of Operational Risk Management for RNAV5 Implementation in the SAM Region

5.3.1 Based on that established in the previous chapters, operational risk management will be applied and the results of the proposed scenario in the Region will be analysed. Accordingly, the indices established by this group of experts will be specified and the risk matrices will be applied, defining the requirements for the implementation of additional defences. Thus, operational risks will be reduced to a level as low as reasonable possible (ALARP), based on the additional defences defined and listed in **Appendix 1 to Chapter 4** – Summary table on hazard identification and risk management. Based on this, the level of operational risk will be determined and the technical feasibility of implementing the RNAV5 route network in the SAM Region will be defined.

5.3.2 In this sense, four types of operation or main activities were established with a view to identifying potential hazards and their associated consequences, and then determining the risk indices and analysing the actions required to mitigate operational risks and reducing them to an acceptable level. A summary of the indices identified is shown below.

a) For **technical hazards**, the following have been defined:

- **Non-RNAV5 aircraft**
- **Degradation of RNAV5 navigation capability**
- **Lack of navaid coverage**

- According to their associated consequences, the hazard was:
  - **Loss of separation**

- The risk management criteria were:
  - **3**, equivalent to a **"remote"** likelihood
  - **C,** equivalent to a **"major"** severity

- The combination of hazard likelihood and severity is equivalent to:

  - **3 C,** which means **acceptable based on risk mitigation**; may require **a decision by management.**

b) For **natural hazards**, the following have been defined:

- **Volcanic ash**
- **Severe turbulence**

- The consequence associated to these hazards was:
  - **Increased ATC workload**

- The risk management criteria were:
  - **4,** equivalent to an **"occasional"** likelihood
  - **C,** equivalent to a **"major"** severity

- The combination of hazard likelihood and severity is equivalent to:
  - **4 C,** which means **acceptable based on risk mitigation**; may require a decision by management.

c) For **regulatory hazards**, the following have been defined:

- **Lack of publication of contingency procedures in case of loss of RNAV5 capability**
- **Outdated operating manuals of the operator**
- **Outdated operating manuals of the ANSP**

- The consequence associated to these hazards was:
  - **Loss of separation**

- The risk management criteria were:
  - **4,** equivalent to an **"occasional"** likelihood
  - **C,** equivalent to a **"major"** severity

- The combination of hazard likelihood and severity results in:
  - **4 C,** which means **acceptable based on risk mitigation**; may require a decision by management.

d) Coordination

This type of **hazard due to lack of coordination** between control centres or between civil and military authorities has been defined as:

- **Incursion of unauthorised aircraft in RNAV5 airspace**
- **Incursion of aircraft in prohibited or restricted airspaces**

- The consequence associated to this hazard was:

- **Loss of separation**

- The risk management criteria were:
  - **4,** equivalent to an **"occasional"** likelihood
  - **B,** equivalent to a **"hazardous"** severity

- The combination of hazard likelihood and severity results in:

  - **4 B,** which means **unacceptable under the existing circumstances**; may require a decision by management.

Safety Risk Assessment Matrix

Probabilidad del riesgo		Gravedad del riesgo				
		Catastrófico A	Peligroso B	Mayor C	Menor D	Insignificante E
Frecuente	5	5A	5B	5C	5D	5E
Ocasional	4	4A	4B	4C	4D	4E
Remoto	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremada-mente improbable	1	1A	1B	1C	1D	1E

5.3.3 Based on the identification and detailed description of hazards and operational risks in the previous sections, it is possible to assess and determine the feasilibity of RNAV5 implementation. Furthermore, based on the risk matrix indices shown above, it is possible to create a risk map and study the various alternatives to minimise or mitigate the risks in RNAV5 implementation.

5.3.4 Based on the operational risk matrix and the index chart specified in the previous chapters, it may be stated that the global average level is "occasional", equivalent to a level 4, and the severity index is 4C, which means that it is acceptable based on risk mitigation and may require a decision by management. With the application of additional measures, the level is reduced to **2 C,** which is within risk tolerability, although a decision by management may still be required.

5.3.5 In keeping with the above, and in order to mitigate and manage the operational risks and reduce the aforementioned indices to an acceptable level, use can be made of technology, regulations, training and supervision (mnemonic rule of three), as additional defences required to mitigate the level of operational risk in a given scenario, and thus reduce the previously established values. The implementation of these additional defences will always be faced with the challenge of lack of economic resources for achieving what is known as a comprehensive defence, according to Phd. J. Reason in his organisational accident theory.

5.3.6 Consequently, a description follows of the actions required in each field of action defined in the previous analysis, in terms of technological applications, regulatory actions or changes, training and continuous supervision of personnel. To that end, the following actions are proposed for an efficient implementation of RNAV5 in the SAM Region. The programme for the prevention of communication errors between ACCs, approved by GREPECAS (NOSS for RNAV5), describes a type of defence to avoid coordination errors between ACCs in the Region.

5.3.7 Strategies aimed at mitigating the operational risks of technical hazards, such as the degradation of navigation capability, are as follows:

a*) Technical hazards: Operation of unauthorised aircraft on RNAV5 routes**, with its consequence of ***loss of separation:

- In the **technological** field
  - Accessibility and availability of the SAM data bank
- In the **regulatory** field
  - Establish effective FPL control procedures
  - RNAV5 operational approval of non-approved aircraft
- In the **training** field
  - Updating of training programmes
- In the **supervision** (continuous oversight) field
  - Define the control of the FPL oversight programme
  - Establish compiance with these measures
- Consequently, the risk management index drops from a level of **3 C** to **2C,** thus reducing the likelihood of occurrence.
- **Entities responsible for this action**: SAM ACCs
ANSPs
CARSAMMA

b) Hazard due to degradation of on-board RNAV5 navigation capability, with the consequence of ***loss of separation:***

- In the **technological** field
  - Use of simulation systems for the crew and ATC personnel
- In the **regulatory** field

- Establish the necessary control procedures

- In the **training** field

  - Training of the crew and ATC personnel

- In the **supervision** (continuous oversight) field
  - Control and continuous monitoring of operators

- Consequently, the risk management index drops form a level of **3 C** to **2C,** thus reducing the likelihood of occurrence.

- **Responsible entities**: States
  ATSP of the SAM Region
  Operators of the Region

c) Lack of navaid coverage, with the consequence of ***loss of separation:***

- In the **technological** field

  - Expand the areas with no coverage for RNAV5

- In the **regulatory** field

- Publish in the AIP the areas with no ground navaid coverage

- In the **training** field
  - None

- In the **supervision** (continuous oversight) field
  - Implement oversight services

- Consequently, the risk management index drops from a level of **3 C** to **2C**, thus reducing the likelihood of occurrence.

- **Responsible entities**: States
  ATSPs of the SAM Region

5.3.8 Strategies for mitigating the operational risks due to natural hazards:

a) Volcanic ash on RNAV5 routes, with the consequence of an ***increased workload for ATC personnel:***

- In the technological field

  - Satellite observation
  - Determine ATC sector/ATFM capacity

- In the regulatory field

  - Publication of ASHTAMs

- Update and apply the established procedures
- Incorporate the procedures in ACC operating manuals
- Determine ATC sector/ATFM capacity
- Air traffic re-planning procedures
- Implement ATFM units or positions (FMU/FMP)

o In the training field
- Training in the continuous application of contingency procedures
- Training of AIS personnel in the preparation of ASHTAMs

o In the supervision (continuous oversight) field
- Implement oversight services

o Consequently, the risk management index drops from a level of **3 C** to **2C**, thus reducing the likelihood of occurrence. Severity is reduced only through the early adoption of these measures.

o **Responsible entities**: States
ATSPs
AIS units

b) Operations with severe turbulence in RNAV5 airspace, with the consequence of an ***increased workload for ATC personnel:***

o In the **technological** field

- Satellite observation alerts
- Use of information *via* data link

o In the **regulatory** field

- Publication of alert NOTAMs
- Determine ATC sector/ATFM capacity
- Air traffic re-planning procedures
- Implement ATFM units or positions (FMU/FMP)

o In the **training** field
- Continuous training in contingency procedures

o In the **supervision** (continuous oversight) field
- Implement oversight services

o Consequently, the risk management index drops from a level of **4 C** to **4D,** thus reducing the likelihood of occurrence. The severity is reduced only through early alert from these measures.

o **Responsible entities**: SAM ACCs

c) Other natural events with the consequence of an ***increased workload for ATC personnel:***

o In the **technological** field

- Integration of technologies

- In the **regulatory** field

  - Specific contingency procedures for this phenomenon

- In the **training** field
  - Training of the crew and ATC personnel

- In the **supervision** (continuous oversight) field
  - Implement regional oversight services

- Consequently, the risk management index drops from a level of **4 C** to **4D,** thus reducing the likelihood of occurrence. The severity is reduced only through the early alert from these measures.

- **Responsible entities**: SAM ACCs
  Operators

5.3.9 Strategies for mitigating the operational risks due to regulatory hazards:

a) Lack of publication of contingency procedures in response to the degradation of RNAV5 capability, with the consequence of ***loss of separation***:

- In the **technological field**

  - None

- In the **regulatory** field

  - Mandatory publication of harmonised contingency procedures
  - Use of standard operations manuals

- In the **training** field
  - Training for ANSPs
  - Training for pilots

- In the **supervision** field
  - Implement regional oversight services

- Consequently, the risk management index drops from a level of **4 C** to **2C,** thus reducing the likelihood of occurence and the severity, as a result of early alert from these measures.

- **Responsible entities**: States
  ANSPs
  Operators

b) Outdated operator's operating manuals in terms of RNAV5, with the consequence of ***loss of separation***:

- In the **technological** field
  - Data bank of management system (SMS) performance indicators and goals
- In the **regulatory** field
  - Operating standards to guarantee the initial management system (SMS) AloS
- In the **training** field
  - Basic and recurrent training in the SMS
- In the **supervision** (continuous oversight) field
  - Implement oversight services with management system performance indicators (SMS)
- The risk management index drops from a level of **3 C** to **2C**. Likelihood is reduced only through early alert from these measures.
- **Responsible entities**: State
  Operators

c) Outdated ANSP operations manuals in terms of RNAV5, with the consequence of ***loss of separation***:

- In the **technological** field
  - Data bank of management systems (SMS) performance indicators and goals
- In the **regulatory** field
  - Operating standards to guarantee the initial management systems (SMS) AloS
- In the **training** field
  - Basic and recurrent training in the SMS
- In the **supervision** (continuous oversight) field
  - Implement oversight services based on the SMS

- The risk management drops from a level of risk of **4 C** to **2C**; severity decreases only through early alert from these measures.

- **Responsible entities**: ANS providers of the SAM Region

5.3.10 Strategies for mitigating the operational risks due to coordination hazards:

a) Civil-military coordination failures affecting the RNAV5 route network, with the consequence of ***loss of separation***:

- In the **technological** field
  - NOTAM bank
- In the **regulatory** field
  - Updated and relevant publications
  - Regulations for coordination between centres
  - Civil-military memoranda of agreement
  - Civil-military coordination (LOAs)
- In the **training** field
  - Civil-military training
- In the **supervision** field
  - Implement LOA services
- The risk management drops from a level of risk of **4 B** to **3B**; only likelihood drops. This is the highest of all risks analysed.
- **Responsible entities**: ACCs and ANSPs of the SAM Region

Chapter 6 Conclusions of Operational Risk Assessment and Mitigation for RNAV5 Implementation

6.1 Introduction

6.1.1 This chapter summarises the background information gathered during the risk assessment, with the purpose of defining the average level of risk for RNAV5 implementation. It also analyses the arguments required to determine the acceptable level of operational risk (ALoS) for the implementation of RNAV5 in the SAM Region. Finally, it contains recommendations derived from this study to support the PBN roadmap approved for the SAM Region.

6.1.2 Chapter 2 of this document contains a general description of the air traffic system in the SAM Region.

6.1.3 Chapter 3 identifies the hazards in the RNAV5 operating environment, assessing their consequences in order to finally determine the resulting level of operational risk.

6.1.4 Chapter 4 covers aspects related to operational risk management, analysing the background information defined by the SAMRA/1 workshop, and the identification of hazards and their consequences, listed in the previous chapter. The group of experts of the SAM Region validated this information, and the methodology for determining the level of operational risks described in the seven-step process was applied, following the data processing required in the SMM manual. In this analytical stage, the two variables defined as the *likelihood* of occurrence of an event and the worst-case scenario are analysed, always making reference to a qualitative analysis. Finally, operational risk matrices are applied in order to determine what applicable additional action could be agreed by the expert workshop to minimise and efficiently contain the operational risks in RNAV5 implementation.

6.1.5 In Chapter 5, a risk acceptability analysis is conducted, based on the defences analysed in the proposed scenario, identifying the defences associated to RNAV5 implementation that exist in the SAM Region. Subsequently, criteria were applied to judge the acceptability from a two-dimentional perspective.

6.2. Final summary of the risk study within the scope of RNAV5 implementation

6.2.1 Based on the analysis of the safety study and the action taken and the proposed additional defences, the average operational risk level has a likelihood of occurrence of **2,** which defines it as **Acceptable** with a severity **C** or **Major**, which means a significant reduction in safety margins, a reduced ability of the operator to comply with the safety margins, which translates into a global risk level of **2 C**. This is within an acceptable range, according to the management triangle, and could require a decision by management and the resulting monitoring of the operation.

6.2.2 In summary, based on the analysis made, it may be concluded that, with the action taken, the implementation of RNAV5 does not face any problems and will not generate additional hazards in the current airspace structure. The implementation of the additional measures identified in this document and listed in the following chapter will optimise the safety of operations in the new operational environment, thus contributing to the achievement of the strategic objectives of the global ATM plan. In sum, safety in the Region is at an acceptable level of operational risk, averaging **2 C**, which falls within the concept of controlled risk.

Chapter 7 Recommendations

7.1 Recommendations emerging from the operational safety assessment for RNAV5 implementation

7.1.1 Based on that described and analysed in this safety study, it may be stated that the commitment of the States of the Region has been a fundamental factor in the achievement of the safety level. However, it should be noted that, as a result of the detailed analysis of the regional system, there are opportunities for improving and preserving the level achieved. Consequently, the States must strengthen and take actions to comply with the roadmap designed for the SAM Region.

7.1.2 Regarding the above, **the States of the Region** shall respond proactively to the changes derived from the operational implementation of RNAV5 and support the technological environment through the incorporation of information and communication technologies (ICTs) in response to the need to promote the exchange of safety data at the regional level, providing relevant safety information for the definition and promotion of performance indicators for the Region, and recording deviations (hot spots) that affect the national and regional ALoS. In the regulatory field, they shall update and publish the changes required to implement RNAV5, and continue promulgating the different contingency plans and programmes that are necessary to implement this system. Regarding training, they shall promote knowledge about the application of, and operation with RNAV5, as well as the implementation of the SMS concept with respect to the operation RNAV5 system. The States shall promote continuous training in RNAV5 operating requirements. Finally, they shall apply the safety oversight and continuous monitoring tools, based on the eight critical elements defined in the SSP.

7.1.3 **The operators** shall exchange safety data at the regional level, providing relevant safety information in order to promote the performance indicators in the Region and identify deviations (hot spots) that affect the ALoS of the Region. Regarding regulations, the operators shall update the contingency plans and programmes required to operate in an RNAV5 environment. In terms of training, they shall encourage recurrent training in RNAV5 operations, using simulation with LOFT-type scenarios and navigation system (RAIM) failure simulation, for timely identification of failures that may affect RNAV5 capability. They shall also implement the SMS concept in relation to the operation of the RNAV5 system and, finally, they shall promote continuous training for operating in a RNAV5 environment.

7.1.4 **The ATS/ANSPs** shall exchange safety data at the regional level, providing safety background information for the establishment of performance indicators for the Region and the identification of deviations (hot spots) that affect the ALoS of the Region. Regarding regulations, they shall update the contingency plans and programmes required to operate in an RNAV5 environment in the ACCs. In the area of training, they shall encourage recurrent training in RNAV5 operations, using standard scenario simulations and contingency programme training for timely identification of failures that might affect RNAV5 capability. They shall continue applying the SMS concept with respect to the implementation of the RNAV5 system and promote continuous training in RNAV5 operations. Finally, they shall adopt and promote supervision based on the eight critical indicators of continuous oversight, based on SMS and SSP requirements.

7.1.5 **The ICAO South American Regional Office** should include a SAMRA/2 workshop in its planning, in order to update the competencies of the critical mass of experts and bridge any gaps that may arise. It should designate focal points and request the participating States to permit their periodic participation, and thus maintain this critical mass of experts during the project, based on the professional level attained.

This type of training will enhance the level knowledge and will provide positive synergies to preserve the safety levels in the SAM Region.

7.1.6 Finally, the observations of this safety assessment study should be part of the safety library of the Region, creating a baseline that will permit the recording of any proposed improvements in the future concerning risk management and the safety level achieved in the SAM Region. This safety study should be circulated to the group of experts that participated in the SAMRA/1 workshop for comments on the different opportunities for improvement to optimise risk levels in the SAM Region and preserve the safety level in the Region.

Appendix 1 to Chapter 4
RNAV5 area navigation specifications
Hazard Identification and Risk Management – SAMRA Experts Workshop

Generic hazard 1	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Non-RNAV5 aircraft flying on RNAV5 routes	Inability of the aircraft to maintain RNAV5 route	**Loss of separation**	• RNAV5 approval regulations • Contingency procedure (Doc 9613 and AC 91-002) • Integrated Aeronautical Information System (AIP, NOTAM, AIP, AIC Supplement and others) • FPL • En-route navigation charts • ATS surveillance service • ACAS/TCAS • Operational manuals of the operator and the ANSP **(3C)**	• RNAV5 operational approval of aircraft with potential for approval: • Direct access of ATS units to updated database of RNAV5-approved aircraft • Improve surveillance in the necessary areas (implement VHF, HF, ADS-CPDLC, ADS-B, Radar and other types of communications) • Direct access of ARO/AIS units to updated database of RNAV5-approved aircraft • Training of operators and air navigation service providers • Applicable contingency procedures upon identifying a non-RNAV5 aircraft on an RNAV5 route • Updating and, if applicable, development of the Operational Manuals of the ANSP, incorporating the appropriate procedures • Designate a responsible party in each State to maintain the database of RNAV5-approved aircraft **(2C)**	States Operators ANSPs

Generic hazard 2	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Loss of RNAV5 capacity on board	Inability of the aircraft to maintain the RNAV5 route	**Loss of separation**	• Contingency procedure (Doc 9613 and AC 91-002) **(3C)** • Alternate "conventional" navigation equipment • Reversal to "conventional" navigation procedures • ATS surveillance service • ACAS • Operational manuals of the operator and the ANSP **(3C)**	• Standardisation of operator procedures in case of loss of RNAV5 capability; • Improve surveillance in the necessary areas (implement VHF, HF, ADS-CPDLC, ADS-B, Radar and other types of communications) • Applicable contingency procedures upon identifying an aircraft that has lost RNAV5 capability • Training of operators, including training of the crew in the application of contingency procedures • Training of air navigation service providers • ATC simulations • RNAV system integrity oversight plan **(2C)**	States Operators ANSPs

Generic hazard 3	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Lack of GND NAVAID coverage	Inability of the aircraft to maintain RNAV5 route	**Loss of separation**	• GNSS • IRS/INS • ATS surveillance • Integrated Aeronautical Information System (AIP, NOTAM, AIP Supplement, AIC, etc.) • NOTAM concerning satellite health • ACAS • Operational manuals of the operator and the ANSP **(3C)**	• Publish the areas with **no** GND NAVAIDS RNAV5 (DME/DME) and VOR/DME coverage • Ensure an appropriate coverage by: a) Implementing the required GND NAVAIDs; or b) Establish GNSS and/or INS as requirement to use the route affected. • Improve surveillance in the required areas (implement VHF, HF, ADS-CPDLC, ADS-B, Radar and other types of communications) • Training of operators and air navigation service providers • Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating the appropriate procedures **(2C)**	States Operators ANSPs

Generic hazard 4	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
NAVAID coverage failure	Inability of the aircraft to maintain RNAV5 route	Loss of separation	• Reversal procedures: a) GNSS, in case of failure of GND NAVAIDs, for equipped aeroplanes b) IRS/INS, in case of failure of GND NAVAIDs, for equipped aeroplanes c) GND NAVAIDs, in case of GNSS and INS failure • Maintenance of GND NAVAIDs • NOTAM concerning satellite health • Flight inspection • Contingency procedures of the operator and the ANSPs. • Operational manuals and ANSP. **(3C)**	• Standardisation of operator procedures in case the aircraft cannot maintain RNAV5 route; • Specific procedures to be applied in case of degradation of RNAV5 navigation capability of the aircraft; • Compliance with the Maintenance plan for the verification of ground radio aids; • Publish critical GND NAVAIDS for RNAV5 routes • Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating the appropriate procedures • Disseminating information about solar storms that might affect the satellite and HF systems **(2C)**	States ANSPs Operators

Generic hazard 6	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Volcanic eruption	Volcanic ash Reduced availability of the route network	**Engine failure** **Increase of ATC workload**	• ASHTAM • MET/PIB/VOLMET briefings • ATM briefings between ATFMUs • AIREP • Application of the procedures foreseen in Chapter 15 (15.8) of Doc 4444 • Operational manuals of the operator and the ANSP • Cancellation of operations on the affected routes **(4C)**	• Re-routing of air traffic • Training of operators, including training of the crew on the application of contingency procedures • Determine ATC sector capacity • ATFM • Updating of LOAs between MET/ATM services • Develop regional contingency procedures • Alternate routes • Updating of the operational manuals of the operator • Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating the procedures foreseen in Chapter 15 (15.8) of Doc 4444 **(4D)**	States ANSPs Operators

Generic hazard 5	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Adverse meteorological effects	Large deviations	**Loss of separation**	• NOTAM • MET/PIB/VOLMET briefings • ATM briefings between ATFMUs • AIREP • Contingency plan • ACAS • Operational manuals of the operator and the ANSP **(4C)**	• Updating of LOAs between MET/ATM services • Alternate routes • QMS/MET/AIS • Updating of the operational manuals of the operator and the ANSP **(2C)**	States Operators ANSPs

RNAV5 WORKING TEAM
RNAV5 AREA NAVIGATION SPECIFICATIONS
HAZARD ITENDIFICATION AND RISK MANAGEMENT

Generic hazard	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Operational manuals of operators – ANSP not updated	Wrong application of procedures	**Loss of separation**	• RNAV5 approval procedures. • Safety assessment • Audits and inspections **(4C)**	• Implement SMS **(2C)**	States Operators ANSP

Generic hazard	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Inadequate civil/military coordination	Unauthorised entry of civil aircraft in restricted airspaces Unauthorised entry of military aircraft from restricted airspaces into ATS routes	**Loss of separation**	• Civil/military LOA • Civil/military coordination committee • Integrated aeronautical information system (AIP, NOTAM, AIP Supplement, AIC, etc.) • Operational manuals of the ANSP • Video charts • Annex 2 and 11 • Application of the procedures foreseen in Chapter 16 (16.1) of Doc 4444 • ACAS • ATS surveillance **(3C)**	• Updating of video charts • Updating of LOAs and general civil/military ATM procedures • ATFM • Training of ATCOs and pilots • Restructuring of segregated sectors/airspaces • Optimise or, if applicable, implement a civil/military coordination committee • Flexible use of airspace • Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating the procedures foreseen in Chapter 16 (16.1) of Doc 4444 and the standards and recommended practices of Annex 2 and 11. **(2C)**	States ANSPs

Generic hazard	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Discrepancy of aeronautical information concerning the route network	Lack of integrity of the data published by the States	**Loss of separation**	• Use of WGS84 • ATS surveillance service • Integrated aeronautical information system (AIP, NOTAM, AIP Supplement, AIC, etc.) • ACAS	• Implement quality management system (QMS) in AIS • Comply with AIRAC cycles	States ANSPs
	Outdated airborne navigation database, if used		• Coordination between the States and the navigation database providers • Agreements between operators and navigation database providers • AIRAC cycles **(4C)**	• Comply with AIRAC cycles • Improve and/or formalise coordination between States and navigation database providers • Publish specific navigation database regulations • Schedule operator inspections • Comply with navigation database regulations established by the States **(3C)**	States Operators

Generic hazard 09	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Inadequate airspace design	Increased ATCO workload	**Operational error of ATCO**	• ATM/Airspace planning • ATS surveillance • Training of ATCOs • SMS implementation standards (paragraph 2.27 of Annex 11) • Capacity management (paragraph 3.1 of Doc 4444) **(3D)**	• Analyse sector workload after route optimisation • Provide a sufficient number of air traffic controllers • Drafting of the safety plan for sectors • ATFM • Updating of ATCO training • Analysis of airspace capacity after RNAV5 route optimisation • Airspace redesign applying continuous descent operations (CDO) • Implementation of RNAV5 SIDs/STARs **(2D)**	States ANSPs

Generic hazard 10	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Navigation deviations due to technical errors	Deviation due to engine failure	**Loss of separation**	• ATS surveillance • Safety assessment • Operational manuals of the operator and the ANSP • Aircraft and operator approval process **(4C)**	• Use of the lateral deviation (LD) reporting form • Monthly delivery of LD data to CARSAMMA • Training of ATCOs in the completion of the lateral deviation reporting form • Use of data available in CARSAMMA for visualising potential technical errors • Operator inspection programmes • Implement ATC system alarms to detect lateral deviations **(2C)**	States ANSPs Operators
	Deviation due to a contingency				

Generic hazard 11	Specific component of hazard	Hazard-related consequence	Current defences to control risk and the risk index	Further action to reduce risk and the resulting risk index	Responsible party
Navigation deviations due to operational errors	Lack of coordination between ACCs	**Loss of separation**	• Measures to reduce operational errors in the ATC coordination loop between adjacent ATCs (GREPECAS15/36) • ATS surveillance • Safety assessment • LOA • Operational manuals of the ANSP **(4C)**	• Implement measures to reduce operational errors in the ATC coordination loop between adjacent ACCs (GREPECAS15/36) • Use of the lateral deviation (LD) reporting form • Investigation of each LD, taking the necessary risk mitigation measures, and monthly delivery of LD data to CARSAMMA • Training of ATCOs in the application of procedures to avoid ATC coordination errors and completion of the lateral deviation reporting form • Use of data available in CARSAMMA to visualise potential errors • Updating and, if applicable, drafting of the operational manuals of the ANSP, incorporating procedures to reduce operational errors in the ATC coordination loop between adjacent ACCs • Implement ATC system alarms to detect lateral deviations • Implement AIDC **(2C)**	States ANSPs

ATTACHMENT A – GLOSSARY OF ACRONYMS

1. ACRONYMS

1.1 List of Acronyms

ACAS	Sistema anticolisión de a bordo / Airborne collision avoidance system
ADS/B	Vigilancia dependiente automatica-radiodifusión Automatic dependent surveillance-broadcasting
ADS/C	Vigilancia dependiente automática-contrato Automatic dependent surveillance-contract
AIP	Publicación de información aeronáutica / Aeronautical information publication
AIS	Servicio de Información aeronáutica / Aeronautical information service
Airprox	Proximidad de aeronaves/aircraft proximity
ALoS	Nivel aceptable de seguridad operacional/Aceptable Level of Safety
ALARP	Nivel más bajo prácticamente posible /As low as practicable
ANS	Servicios de navegación aérea Air navigation services
ANSP	Proveedores de Servicios de Navegación Aérea/Air Navigation Service Providers
ASM	Gestión del espacio aéreo/ Airspace Management
ASHTAM	NOTAM sobre cenizas volcánicas/NOTAM on volcanic ash
ATC	Control de tránsito aéreo/ Air Traffic Control
ATCO	Controlador de tránsito aéreo /Air traffic controller
ATFM	Gestión de afluencia del tránsito aéreo/ Air Traffic Flow Management
ATM	Gestión del tránsito aéreo/ Air Traffic Management
ATMCP	Grupo de Expertos sobre el Concepto Operacional de Gestión de Tránsito Aéreo/Air Traffic Management Concept Panel
ATN	Red de telecomunicaciones aeronáuticas/Aeronautical Telecommunication Network
ATS	Servicio de tránsito aéreo/ Air Traffic Services
ATSP	Proveedores de Servicios ATS / ATS providers
ATSRO	Optimización de rutas ATS /ATS route optimization
CAA	Autoridad de Aeronáutica Civil / Civil Aviation Authority
CAR/SAM	Regiones Caribe y Sudamérica/Caribbean/South American Regions
CARSAMMA	Agencia Regional de Monitoreo CAR/SAM / CAR/SAM Monitoring Regional Agency
CNS/ATM	Comunicaciones, navegación y vigilancia/Gestión del tránsito aéreo/ Communications, Navigation and Surveillance/Air Traffic Management
CPDLC	Comunicaciones por enlace de datos controlador-piloto /Controller-Pilot Data Link Communications
CTA	Área de control /Control Area
CRM	Modelo de riesgo de colisión / Collision Risk Model
DME	Equipo Radiotelemétrico/Distance-Measuring Equipment

FANS-1/A	Sistemas de navegación aérea del futuro – Aviónica/ Future Air Navigation Systems - Avionics
FIR	Región de información de vuelo /Flight Information Region
FUA	Uso Flexible del Espacio Aéreo /Flexible Use of Airspace
GLS	Sistema de aterrizaje GBAS / GBAS Landing System
GNSS	Sistema mundial de navegación por satélite / Global Navigation Satellite System
GPI	Iniciativas del Plan Mundial / Global Plan initiatives
GREPECAS	Grupo Regional de Planificación y Ejecución CAR/SAM/ CAR/SAM Regional Planning and Implementation Group
HF	Alta frecuencia/ High Frequency
IATA	Asociación del Transporte Aéreo Internacional/ Internacional Air Transport Association
INS	Sistema de navegación inercial / Inertial navigation system
IRS	Sistema de referencia inercial / Inertial reference system
LOA	Cartas de acuerdo operacionales / Letter of operational agreement
MET	Servicios meteorológicos para la navegación aérea / Meteorological services for air navigation
NAVAID	Ayudas a la Navegación / Navigation aids
NDB	Radiofaro no direccional /Non-Directional Beacon
NOTAM	Aviso al Personal Encargado de las Operaciones de Vuelo/Notice to Airmen
NOSS	Encuesta de seguridad en operaciones normales / Normal Operations Safety Survey
OACI	Organización de aviación civil Internacional International /Civil Aviation Organization
PBN	Navegación Basada en la Performance /Performance-Based Navigation
PIB	Boletín de información previa al vuelo / Pre-flight information bulletin
RAIM	Vigilancia autónoma de la integridad en el receptor / Receiver autonomous integrity monitoring
RLA/06/901	Proyecto Regional Latinoamericano 06/901 / Regional Latin American Project 06/901
RNAV	Navegación de área/Area Navigation - RNAV Route: Ruta de navegación de área/Area navigation route
RNP	Performance de navegación requerida /Required Navigation Performance
RNP AR	Requerimiento de aprobación para la performance de navegación requerida/ Required Navigation Performance Approval Required
RNPSORSG	Grupo de Estudio sobre RNP y Requerimientos Operacionales Especiales/RNP and Special Operational Requirements Study Group
SARPS	Normas y métodos recomendados (ICAO)/ Standards and Recommended Practices (ICAO)
SAM	Sudamérica /South America
SAMRA	Taller sobre gestión del Riesgo SAM /SAM Risk Analysis workshop
SAM/IG	Grupo de Implantación SAM / SAM Implementation Group
SMM	Manual de Seguridad Operacional /Safety Management Manual
SMS	Sistemas de Gestión de la Seguridad Operacional / Safety Management System
SSR	Radar secundario de vigilancia/Secondary Surveillance Radar
SSP	Programa de seguridad del Estado / State safety programme
STAR	Llegada Normalizada por Instrumentos/Standard Instrument Arrival
TCAS	TCAS Sistema de anticolisión de tránsito / Traffic collision avoidance system
TIC	Tecnologías de la información y comunicación / Information and communication technology

TLS	Nivel de seguridad deseado/Target Level of Safety
TMA	Áreas de Control / Terminal Control Area
SUA	Espacios aéreos de uso especial /Special use of Airspace
USOAP	Programa Universal de auditorías de la seguridad operacional de la OACI / ICAO Universal safety oversight audit Programme
VHF	Muy alta frecuencia /Very High Frequency
VOR/DME	Radiofaro omnidireccional VHF/Equipo radiotelemétrico/Very High Frequency Omnidirectional Radio Range/Distance-Measuring Equipment
HF	Alta frecuencia / High frequency
WEB	
WGS84	Sistema geodésico mundial – 1984 /World geodetic system - 1984

ATTACHMENT B

DEFINITIONS AND BIBLIOGRAPHY

Explanation of terms for ATSRO

The drafting and explanation of this document are based on some particular terms and expressions as described below:

CAR/SAM PBN Roadmap. Document that offers an appropriate guide for air navigation service providers, operators and airspace users, regulatory organisations and international organisations, on the evolution of navigation, as one of the essential systems that support air traffic management, indicating the RNAV and RNP navigation applications that shall be implemented in the short, medium and long term in the CAR/SAM Regions.

Area navigation (RNAV). A method of navigation which permits the operation of aircraft on any desired flight path within the coverage of ground- or space-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

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Note.- Area navigation includes performance-based navigation as well as other operations not included in the definition of performance-based navigation.

Performance-based navigation (PBN). Performance-based navigation requirements applicable to aircraft conducting operations on an ATS route in an instrument approach procedure or in a designated airspace.

Note.— Performance requirements are expressed in the navigation specifications in terms of the precision, integrity, continuity, availability and functionality required for the proposed operation within the context of a particular airspace concept.

Navigation specification. Set of aircraft and crew requirements that is necessary to support performance-based navigation operations within a defined airspace. There are two classes of navigation specifications:

- **RNP specification.** Navigation specification based on area navigation that includes the performance control and alert requirement, designated with the prefix RNP; for example, RNP 4, RNP APCH.

- **RNAV specification**. Navigation specification based on area navigation that does not include the performance control and alert requirement, designated with the prefix RNAV; for example, RNAV 5, RNAV 1.

Note.— The Manual on performance-based navigation (Doc 9613)*, in its Volume II, contains detailed guidelines on navigation specifications.*

ATSRO: ATS route optimisation in the SAM Region.

Safety. A condition in which the risk of harm or damage is limited to, and maintained at or below, an acceptable level, through a continuous process of hazard identification and risk management.

AIRPROX: Loss of separation and the potential hazard of in-flight collision

Process: Series of activities that transform inputs into a product or service and generate an impact on the system or society.

Hazard – A condition or object that has the potential of causing harm to personnel, damage to the equipment or structures, loss of material, or impairing the ability to perform a given function.

Risk – The assessment of the consequences of a hazard, expressed in terms of likelihood and severity, taking as a reference the worst possible scenario.

Likelihood – The possibility of occurrence of an event or insecure condition.

Severity – The possible effects of an event or insecure condition, taking as a reference the worst possible scenario

Bibliography:

- Annex 11 for ATS systems
- Global air navigation plan for CNS/ATM systems (doc 9750)
- CAR/SAM regional air navigation plan (doc 8739)
- Eleventh air navigation conference (doc 9854)
- Manual on safety systems (doc 9859)
- Project RLA 06/12, 1 and 2
- Special use airspaces (doc 8126)
- NOSS Manual, ICAO doc. 9910 "Normal Operations Safety Survey (NOSS) Ed 1".
- Summary of GREPECAS Conclusion 15/36, Programme for the prevention of errors between adjacent ACCs.

Safety Case concept applied to the study and definition of a safety problem, applying the operational risk methodology used by Eurocontrol and the Manual for Airspace Planning (ASM.ET1.ST03.4000.EAPM.02.02), which may be found in the following web site: http://www.eurocontrol.int/airspace/gallery/content/public/EUROCONTROL%20APM%20V2_Ed-2_Released%20Issue_Amendment%202_010606.pdf.

ICAO South American (SAM) Office
http://www.lima.icao.int/MeetProg/mt_MeetingDocumentation.asp?wShortTitle=ATSRO2&wLanguage=S

ICAO Safety Management Manual, Doc 9859, version 2
http://www.icao.int/fsix/library1.cfm

Agenda Item 4: Standards and procedures for performance-based navigation operations approval

Approval of SBAS-based RNP APCH operations

4.1 On 23 July 2010, the Secretary General of the ICAO Council sent letter SP 65/4-10/53 to the Contracting States, which contained **updated guidelines** for the issuance of operational approvals for approaches with required navigation performance (RNP APCH).

4.2 The guidelines were updated by the ICAO Secretariat, with the assistance of the Performance-Based Navigation Study Group (PBNSG), to accommodate **satellite-based augmentation system (SBAS)** performance, and do not invalidate the operational approvals already issued according to the RNP APCH navigation specification foreseen in the *Manual on performance-based navigation (PBN)* (Doc 9613).

4.3 Likewise, ICAO, through the aforementioned letter, urged all States wishing to implement RNP APCH operations, to establish a suitable approval process in keeping with the guidelines that were attached to the cited letter.

4.4 The satellite-based augmentation system (SBAS) is an augmentation system of broad coverage whereby the user receives augmentation information *via* satellite.

4.5 With respect to RNP APCH operations based on SBAS (up to LP and LPV minima), it is not foreseen that the South American (SAM) Region will incorporate a satellite-based augmentation system (SBAS) in the short or medium term. Consequently, these operations will not be conducted in South America. Nevertheless, the operators of the SAM Region may request from their respective authorities the issuance of RNP APCH authorisations up to LP and LPV minima so as to be able to operate in other Regions where SBAS-based RNP APCH operations have been implemented, like the United States and Europe.

4.6 The Meeting requested the Secretariat to coordinate with the SRVSOP Technical Committee the drafting of an advisory circular (AC) establishing the harmonised regional criteria for SAM States.

Forms CMA F5 and CMA F6 for PBN approvals/cancellations

4.7 The OPS/AIR Group analysed each of the information fields contained in the forms corresponding to PBN approval and approval cancellation, identified as CMA F5 and CMA F6, respectively. The Group noted that these forms take into account all relevant information proposed by the OPS/AIR working group at the SAM/IG/5 meeting, and subsequently approved by CARSAMMA. Accordingly, the Meeting agreed to urge the States to start sending forms CMA F5 and CMA F6, as applicable, to Regional Monitoring Agency, CARSAMMA, in order to have a better control of the current status of the PBN capacity of the fleet and operators in the Region. It also agreed to request the States to include forms CMA F5 and CMA F6 in the respective technical guidance documentation. The aforementioned forms are shown in Appendices B and C to Agenda Item 3.

Ground and in-flight validation of instrument flight procedures

4.8 Ground and in-flight validation of instrument flight procedures is part of the initial certification process and of the periodic quality assurance programme established by each State.

4.9 Taking this into account, it is deemed necessary to establish, for the Regional System, standard criteria on ground and in-flight validation of satellite-based PBN instrument approach procedures.

4.10 The development of an RNAV or RNP instrument flight procedure for an ATS route is done by stages: from the origin of the data, through the surveying, to the final publication of the procedure and its subsequent encoding for its use in an airborne navigation database. Each stage of the procedure design process should have a quality control procedure to ensure that the required precision and integrity levels have been achieved and maintained. These quality control procedures are described in the PANS-OPS (Doc 8168), Volume II.

4.11 The Meeting took note and analysed the proposed Advisory Circular, identified as AC 91-012, which contains a guide for the validation of performance-based navigation (PBN) instrument flight procedures (IFP) based on satellites, as required prior to their publication in the AIP.

4.12 The Meeting considered that the aforementioned document was a significant contribution to the flight inspection area of each Administration, providing assistance for the validation of the various instrument flight procedures supported by the satellite navigation system prior to their publication in the respective AIP. Likewise, it recommended that AC 91-012 be sent to the States of the Region and International Organisations, for review and analysis by the flight inspection experts, and their comments be sent through the Secretariat to the SRVSOP Technical Committee for the inclusion of the corresponding improvements, and then submitted to the SAM/IG/7 meeting for its final approval, urging the States to adopt it.

4.13 **Appendix A** to this part of the report presents a text proposed of the SRVSOP CA 91-012, Flight Validation (FV) for satellite-based performance-based navigation (PBN) Instrument Flight Procedures (IFP)

RAIM Availability Prediction Programme

4.14 The Meeting expressed its concern about the status of implementation of Conclusion SAM/IG/5-5, which has not been implemented yet. Thus, the States and operators of the Region do not have a definition and/or an approved RAIM availability prediction programme, as required in Doc 9613, for the approval of operators and aircraft wishing to use the various navigation specifications, including RNAV 5. An analysis of the different aspects revealed that no progress has been made on the following:

a) The operators do not have an approved en-route FD/FDE availability prediction programme applicable to the SAM Region;

b) The Authorities do not have regulations for the approval of an FD/FDE availability prediction programme;

c) The FAA/VOLPE programme does not consider the airspace outside of the United States;

d) The AUGUR (EUROCONTROL) programme, although taking into account the airports and radio aids of the SAM Region, establishes that calculations are only valid for the EUR Region; and

e) It is recognised that the Region does not have an en-route FD/FDE availability prediction programme nor the appropriate approval procedures.

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

a) Taking into account that the AUGUR (EUROCONTROL) tool includes the airports and radio aids of the SAM Region, it is necessary, through the ICAO Regional Office, to contact EUROCONTROL in order to establish the possibility of extending the validity of the prediction calculation performed by the AUGUR tool, to cover the different flight stages in the SAM Region, asking the following questions:

(i) Indicate if the criterion of not requiring RAIM availability prediction for RNAV5 (BRNAV) operations when 24 satellites or more are in service is valid for the SAM Region.

(ii) Is it possible to use the RAIM availability forecasting tool, AUGUR, in the SAM Region? If not, what steps should be taken for its validation?

(iii) What RAIM availability prediction tool will the European operators use when operating in the RNAV5 routes to be soon implemented in the SAM Region?

b) Contact should be made with the FAA through the ICAO Regional Office in order to obtain guidance on the procedures for the approval of an FD/FDE availability prediction programme and the procedures used by its operators when conducting GNSS-based RNAV operations outside of the US airspace, asking the following questions:

(i) What RAIM availability prediction tool will US operators use when operating in RNAV5 routes to be soon implemented in the SAM Region?

(ii) What actions should be taken to extend the application of the VOLPE tool to the SAM Region?

c) The ICAO Regional Office is leading the development of an FD/FDE availability prediction programme for the SAM Region, for use during all flight phases.

Requirements to be established by the States in order to recognise the RNAV5 capacity of foreign operators

4.16 The Meeting took note of the concern expressed by IATA and operator representatives attending the meeting, with respect to the requirements to be established by the States in order to recognise the RNAV5 capacity of foreign operators that need to operate in, or overfly, their territory.

4.17 In view of the foregoing, the Meeting agreed to incorporate in Appendix I to Agenda Item 3 and in Appendix B to Agenda Item 1, two new tasks to be carried out by the States of the Region:

a) That the States, if so required, publish the background information that foreign operators wishing to operate in their territory must submit so that the RNAV 5 approval issued by their authority can be recognised, specifying the document or link where such information can be found.

b) That the States, if so required, publish the background information that foreign operators wishing to overfly their territory must submit so that the RNAV 5 approval issued by their authority can be recognised, specifying the document or link where such information can be found.

4.18 The Secretariat was requested to urge the States to fulfil these two new tasks before the SAM/IG/7 meeting.

Review of the status of implementation of the conclusions formulated by the meetings of the SAM Implementation Group and pending activities

4.19 During the previous SAMIG meetings, conclusions were formulated in all the areas involved, and a number of activities were adopted for the implementation of different functions that will allow the Region to continuously evolve towards the global ATM Operational Concept and, particularly, to the implementation of performance-based navigation.

4.20 In the OPS/AIR field, said conclusions and activities were analysed, and the established dates were updated as required. The amendments introduced and the resulting comments are shown in Appendices A and B to Agenda Item 1.

APPENDIX / APÉNDICE A

**(Available in Spanish language only.
Will be translated once States approve this document)**

CIRCULAR DE ASESORAMIENTO

CA : 91-012
FECHA : 22/10/10
REVISIÓN : ORIGINAL
EMITIDA POR : SRVSOP

ASUNTO: Validación en vuelo (FV) de los procedimientos de vuelo por instrumentos (IFP) de la navegación basada en la performance (PBN) apoyada en satélite

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1. PROPÓSITO

Esta circular de asesoramiento establece la política y orientación para realizar la validación en vuelo (FV) de los procedimientos de vuelo por instrumentos (IFP) de la navegación basada en la performance (PBN) apoyada en satélite. También describe los requisitos para las evaluaciones en simulador y de obstáculos que deben llevarse a cabo antes de la FV. Esta validación se realizará previa la promulgación de un IFP en la publicación de información aeronáutica (AIP) del Estado.

2. DOCUMENTOS RELACIONADOS

Annex 6	Operation of aircraft
Annex 10	Aeronautical telecomunications
	Volume I: Radio navigation aids
Doc. 9613	Performance-based navigation (PBN) manual
Doc. 8168	Aircraft operations
	Volume I: Flight procedures
	Volume II: Construction of visual and instrument flight procedures
Doc. 8071 – V 2	Testing of satellite-based radio navigations systems
FAA Notice 8260.67	Flight validation (FV) of satellite-based performance-based navigation (PBN) instrument flight procedures (IFP) – Current guidance and criteria

3. DEFINICIONES Y ABREVIATURAS

3.1 Definiciones

a) **Autorización obligatoria (AR).-** Autorización especifica requerida por la Administración de Aviación Civil (AAC) para que un explotador pueda realizar operaciones de aproximación RNP con autorización obligatoria (RNP AR APCH) según la CA 91-009 del SRVSOP.

b) **Diseñador de procedimiento.-** Un representante de la organización responsable del diseño del procedimiento correspondiente, que tiene conocimientos sobre los criterios de diseño de procedimientos por instrumentos.

c) **Evaluador.-** El miembro de la tripulación de vuelo que tiene a su cargo la autoridad de la aprobación final de la validación en vuelo. Este podría ser un miembro de la tripulación de vuelo adicional, el co-piloto o el piloto al mando.

d) **Evaluación de obstáculos.** Una evaluación que se lleva a cabo siguiendo las directrices de lo establecido en El Doc. 8071 - Manual sobre ensayo de radioayudas para la navegación.

e) **Sistema de grabación autónoma del sistema de posicionamiento global (AGRS).** Un sistema de grabación y posición independiente del sistema de navegación de la aeronave capaz de lo siguiente: almacenamiento del IFP, visualización de mapa en movimiento que representa el curso del IFP, registro de la FV incluyendo el tiempo y las posiciones en tres de dimensiones (3D) en el espacio con una frecuencia de muestreo de no menos de 1 Hz, y la habilidad de procesar posteriormente la información registrada. El AGRS también debe ser compatible con referencia a las especificaciones mínimas de performance de operación aplicables para el equipo del Sistema mundial de navegación por satélite (GNSS) o para el sistema previsto para la ruta de vuelo o procedimiento.

f) **Capacidad de vuelo (flyability).** Una verificación o sistema de verificaciones que garantice que el procedimiento se puede volar de manera segura como fue diseñado. Estas verificaciones incluyen pero no están limitadas a: el cumplimiento con el diseño del procedimiento, la aceptabilidad a cualquier excepción a las normas, los ángulos de inclinación lateral, velocidades, pendientes de descenso, regímenes de balanceo/roll rates, longitudes de las derrotas, cuestiones de carga de trabajo, complejidad del procedimiento, la alineación de la pista, etc.

g) **Navegación de área (RNAV)**.-Método de navegación que permite la operación de aeronaves en cualquier trayectoria de vuelo deseada, dentro de la cobertura de las ayudas para la navegación basadas en tierra o en el espacio, o dentro de los límites de capacidad de las ayudas autónomas, o de una combinación de ambos métodos. La navegación de área incluye la navegación basada en la performance así como otras operaciones no contempladas en la definición de navegación basada en la performance.

h) **Navegación basada en la performance (PBN)**.- Requisitos para la navegación de área basada en la performance que se aplican a las aeronaves que realizan operaciones en una ruta ATS, en un procedimiento de aproximación por instrumentos o en un espacio aéreo designado. Los requisitos de performance se expresan en las especificaciones para la navegación.

i) **Performance de navegación requerida (RNP)**.-Especificación de navegación que requiere control y alerta de la performance de a bordo.

j) **Sistema de gestión de vuelo (FMS)**.- Sistema integrado, que consta de un sensor de a bordo, de un receptor y de una computadora con bases de datos sobre performance de navegación y de la aeronave, capaz de proporcionar valores de performance y guía RNAV a un sistema de presentación y de mando automático de vuelo.

k) **Sistema mundial de determinación de la posición (GPS)**.-El Sistema mundial de navegación por satélite (GNSS) de los Estados Unidos, es un sistema de radionavegación basado en satélites que utiliza mediciones de distancia precisas para determinar la posición, velocidad y la hora en cualquier parte del mundo. El GPS está compuesto de tres elementos: espacial, de control y de usuario. El elemento espacial nominalmente está formado de al menos 24 satélites en 6 planos de orbita. El elemento de control consiste de 5 estaciones de monitoreo, 3 antenas en tierra y una estación principal de control. El elemento de usuario consiste de antenas y receptores que proveen posición, velocidad y hora precisa al usuario.

l) **Sistema mundial de navegación por satélite (GNSS)**.- Término genérico utilizado por OACI para definir cualquier sistema de alcance global de determinación de la posición y de la hora, que comprende una o más constelaciones principales de satélites, tales como el GPS y el Sistema orbital mundial de navegación por satélite (GLONASS), receptores de aeronave y varios sistemas de vigilancia de la integridad, incluyendo los sistemas de aumentación basados en la aeronave (ABAS), los sistemas de aumentación basados en satélites (SBAS), tales como el sistema de aumentación de área amplia (WAAS) y los sistemas de aumentación basados en tierra (GBAS), tales como el sistema de aumentación de área local (LAAS). La información de distancia será provista, por lo menos en un futuro inmediato, por el GPS y GLONASS.

m) **Validación en vuelo (FV).** Una verificación final de la definición de las derrotas del procedimiento y de la capacidad de vuelo, realizada en un avión PBN apropiado, para garantizar que el procedimiento se puede volar de forma segura.

n) **Vigilancia autónoma de la integridad en el receptor (RAIM)**.-Técnica utilizada dentro de un receptor/procesador GPS para determinar la integridad de sus señales de navegación, utilizando únicamente señales GPS o bien señales GPS mejoradas con datos de altitud barométrica. Esta determinación se logra a través de una verificación de coherencia entre medidas de pseudodistancia redundantes. Al menos se requiere un satélite adicional disponible respecto al número de satélites que se necesitan para obtener la solución de navegación.

3.2 Abreviaturas

AAC	Administración/Autoridad de Aviación Civil
AAO	Obstáculo que se asume como adverso
ABAS	Sistema de aumentación basado en la aeronave
AGRS	Sistema de grabación autónoma del sistema de posicionamiento global
AIP	Publicación de información aeronáutica
APCH	Aproximación
APV	Procedimiento de aproximación con guía vertical
APV/baro-VNAV	Operaciones de aproximación con guía vertical/Navegación vertical barométrica}
AR	Autorización obligatoria
AIRAC	Reglamentación y control de información aeronáutica
AC	Circular de asesoramiento (FAA)
AFIS	Sistema de inspección automático de vuelo
AFM	Manual de vuelo de la aeronave
AMC	Métodos aceptables de cumplimiento
ANSP	Proveedor de servicios de navegación aérea
ATC	Control de tránsito aéreo
ATS	Servicio de tránsito aéreo
baro-VNAV	Navegación vertical barométrica
CA	Circular de asesoramiento (SRVSOP)
CDI	Indicador de desviación de curso
CDU	Pantalla de control
CRC	Verificación por redundancia cíclica
DA	Altitud de decisión
EGPWS/TAWS	Sistema de advertencia de la proximidad del terreno que tenga una función de predicción de riesgos del terreno
FAA	Administración Federal de Aviación de los Estados Unidos
FAF	Punto de referencia de aproximación final
FAS	Tramo de aproximación final

FD	Director de vuelo
FDE	Detección de fallas y exclusión
FMC	Computadora de gestión de vuelo
FMS	Sistema de gestión de vuelo
FPA	Ángulo de trayectoria de vuelo
ft	pies
FV	Validación en vuelo
GBAS	Sistema de aumentación basado en tierra
GNSS	Sistema mundial de navegación por satélite
GLONASS	Sistema orbital mundial de navegación por satélite
GPS	Sistema mundial de determinación de la posición
GV	Validación en tierra
IAF	Punto de referencia de aproximación inicial
IAP	Procedimiento de aproximación por instrumentos
IFP	Procedimientos de vuelo por instrumentos
IFR	Reglas de vuelo por instrumentos
IMC	Condiciones meteorológicas de vuelo por instrumentos
INSAT	Insatisfactorio
IRU	Unidad de referencia inercial
LAAS	Sistema de aumentación de área local
LAR	Reglamentos Aeronáuticos Latinoamericanos
LOA	Carta de autorización/carta de aceptación
LP	Actuación del localizador
LPV	Actuación del localizador con guía vertical
MAPt	Punto de aproximación frustrada
MEL	Lista de equipo mínima
NA	No disponible
NAVAIDS	Ayudas para la navegación
NM	Millas marinas
NPA	Aproximación que no es de precisión
NOTAM	Aviso a los aviadores
OACI	Organización Internacional de Aviación Civil
OCA/H	Altitud/altura de franqueamiento de obstáculos
OM	Manual de operaciones
OJT	Instrucción práctica en el puesto de trabajo
PANS-OPS	Procedimientos para los servicios de navegación aérea – Operación de aeronaves
PBN	Navegación basada en la performance

PDOP	Dilución de precisión de la posición
RAIM	Vigilancia autónoma de la integridad en el receptor
RF	Arco de radio constante hasta un punto de referencia/Radius to a fix
RFI	Interferencias de radio frecuencias
RNAV	Navegación de área
RNAV(GNSS)	Aproximaciones RNP APCH basadas en GNSS (GPS)
RNP	Performance de navegación requerida
RNP APCH	Aproximación de performance de navegación requerida
RNP AR APCH	Aproximación de performance de navegación requerida con autorización obligatoria (RNP AR – EASA).
ROC	Margen requerido de franqueamiento de obstáculos
RWY	Pista
SAAAR	Special Aircraft and Aircrew Authorization Required (FAA)
SAT	Satisfactorio
SBAS	Sistema de aumentación basado en satélites
SID	Salida normalizada por instrumentos
SL	Cartas de servicio
SOP	Procedimientos operacionales normalizados
SRVSOP	Sistema Regional de Cooperación para la Vigilancia de la Seguridad Operacional
STAR	Llegada normalizada por instrumentos
STC	Certificado suplementario de tipo
TCDS	Hoja de datos del certificado de tipo
TCH	Altura de franqueamiento del umbral
TSO	Disposición técnica normalizada
VGSI	Indicador de pendiente de planeo visual
VMC	Condiciones meteorológicas de vuelo visual
VNAV	Navegación vertical
VOR	Radiofaro omnidireccional VHF
VPA	Ángulo de trayectoria vertical
WAAS	Sistema de aumentación de área amplia
WGS	Sistema geodésico mundial
WPT	Punto de recorrido / waypoint

4. INTRODUCCIÓN

4.1 En los procedimientos de vuelo por instrumentos se presentan rutas normalizadas, áreas de maniobras, altitudes de vuelo y los mínimos de aproximación correspondientes a las reglas de vuelo por instrumentos (IFR). Entre estos procedimientos se incluyen aerovías, rutas fuera de aerovías, procedimientos de aproximación por instrumentos (IAP), procedimientos de salida por instrumentos, rutas de llegada al área terminal y procedimientos basados en el uso de sistemas de

navegación de área (RNAV) y sistemas de performance de navegación requerida (RNP).

4.2 La inspección en vuelo de los procedimientos de vuelo por instrumentos, como se detalla en los capítulos del Doc 8071 – Manual sobre ensayos de radioayudas para la navegación, debería asegurar que el procedimiento está debidamente apoyado por las radioayudas para la navegación apropiadas.

4.3 Por su parte, la validación en vuelo de los procedimientos de vuelo por instrumentos abarca la verificación de todos los datos de navegación y obstáculos, la verificación de la infraestructura requerida, la evaluación del trazado de las cartas y la posibilidad de practicar el vuelo según el procedimiento.

4.4 Cuando un Estado puede verificar, mediante la validación en tierra, la exactitud e integridad de todos los datos de navegación y obstáculos considerados en el diseño del procedimiento y todo otro factor considerado normalmente en la validación del vuelo, puede prescindirse del requisito de la validación en vuelo.

4.5 Los procedimientos de vuelo por instrumentos deberían formar parte del proceso de validación en vuelo para la certificación inicial y del programa periódico de garantía de calidad establecido por cada uno de los Estados.

5. Descripción general del proceso

5.1 Información general de validación

a) La validación es el último paso de control de calidad en el proceso de diseño de los procedimientos para la PBN. El propósito de la validación es la comprobación de todos los datos sobre obstáculos y de navegación, y la evaluación de la capacidad de vuelo del procedimiento. La validación normalmente consiste de la validación en tierra y en vuelo. Los procedimientos de la PBN que contengan datos sobre el tramo de aproximación final (FAS) requieren un sistema aprobado para validar los elementos de los datos del FAS para la alineación del curso, ángulo, altura de franqueamiento del umbral (TCH) y la verificación por redundancia cíclica (CRC).

b) Exactitud de los datos. Los IFP PBN, RNAV (GNSS), RNAV (RNP), basados en satélites requieren datos muy precisos, basados en el sistema geodésico mundial WGS-84. Esto requiere una integridad muy alta de todos los datos de levantamiento topográfico utilizada en el procedimiento de vuelo y la base de datos de navegación utilizada por los aviones. Es obligatorio que se mantenga un sistema adecuado de garantía de calidad que abarque todos los ámbitos de la recopilación de datos, elaboración, publicación y desarrollo de las bases de datos de navegación (Ref. Anexos 4, 11, 14 y 15 al Convenio sobre Aviación Civil Internacional). Los errores de entrada, especialmente en la casilla de datos FAS, pueden resultar en cambios significativos en la trayectoria de vuelo en relación a la pista. La validación debe garantizar el uso de datos correctos para un análisis válido del procedimiento de vuelo.

c) Validación en tierra (GV). La GV es una revisión de todo el paquete de procedimientos de vuelo por instrumentos por una persona entrenada en el diseño de procedimientos y con conocimientos adecuados de validación en vuelo. Su objetivo es identificar las desviaciones de los criterios y la documentación, y evaluar sobre el terreno en la medida de lo posible, los elementos que serán evaluados en la fase de validación de vuelo. Los temas identificados durante la fase de validación en tierra deben de abordarse antes de la fase de validación en vuelo. La GV puede incluir tanto una evaluación en el simulador de vuelo y la evaluación de obstáculos.

d) Validación en vuelo (FV). La FV de los procedimientos de vuelo por instrumentos debe llevarse a cabo como parte de la certificación inicial. Debe ser realizada por un piloto de validación/evaluador de vuelo calificado y con experiencia y autorizado de conformidad con esta circular de asesoramiento. Los objetivos de la FV son:

1) realizar una evaluación de la capacidad de vuelo para determinar que el procedimiento de vuelo puede realizarse de forma segura;

2) proporcionar la garantía final de que se ha obtenido el adecuado franqueamiento de obstáculos (mediante el Doc 8071 de OACI o documento equivalente);

3) verificar que todos los datos de navegación que se publicarán son correctos;

4) verificar que los elementos de los datos FAS proveen guía de navegación, como se designó, al umbral físico de la pista o al punto en el espacio requerido.

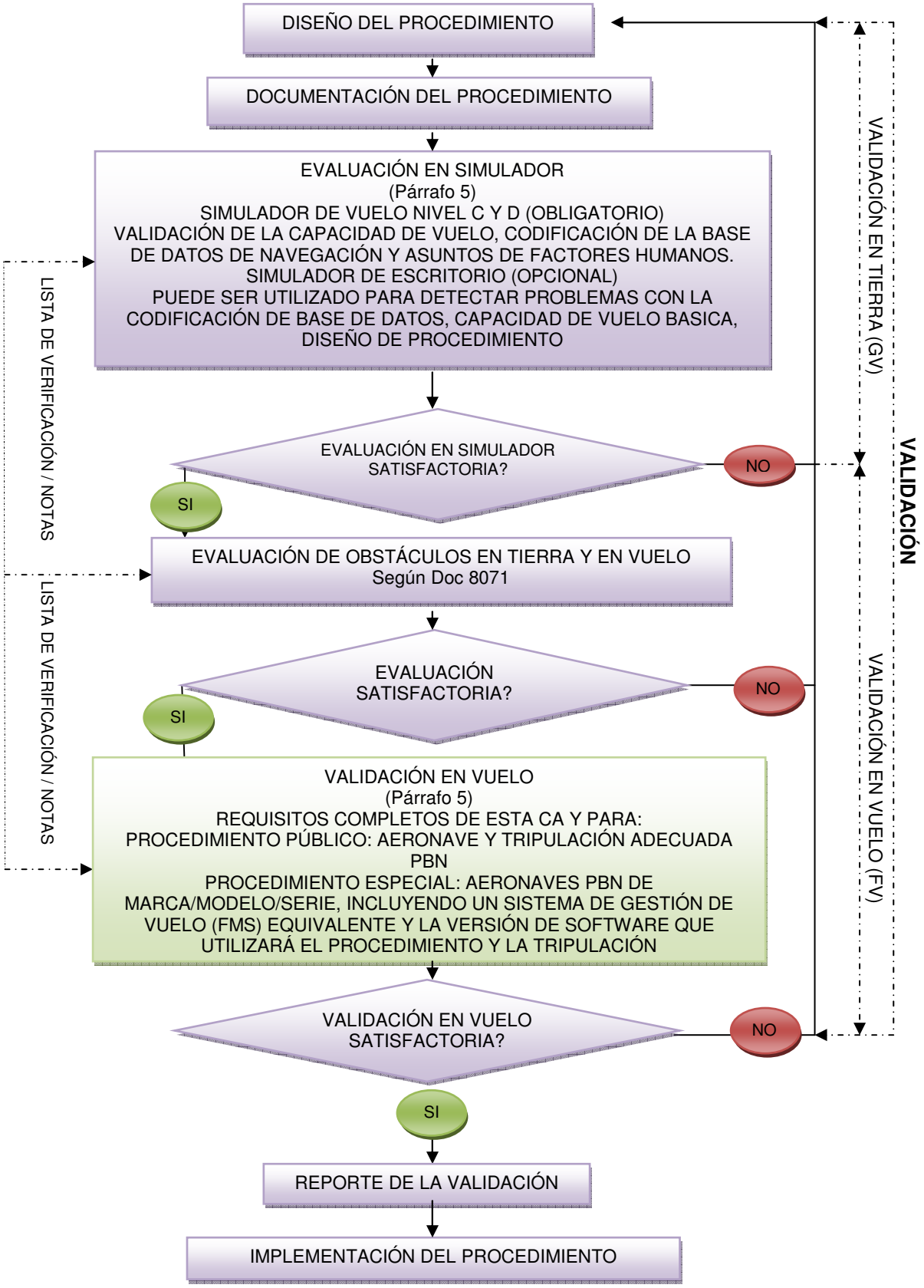
5) verificar que todas las infraestructuras necesarias, tales como las marcas de pista, iluminación, comunicaciones y las fuentes de navegación, estén en su lugar y operativas;

6) evaluar los otros factores operacionales, tales como la cartografía, infraestructura necesaria, visibilidad, etc.

Nota.- *La validación en vuelo no debe confundirse con inspección en vuelo. La inspección en vuelo de los procedimientos de vuelo por instrumentos es necesaria para asegurar que las radios ayudas de navegación apoyan adecuadamente el procedimiento. La inspección en vuelo se lleva a cabo como parte del programa detallado en el Doc 8071 – Manual sobre ensayos de radioayudas para la navegación y es realizado por un inspector de vuelo calificado que utiliza una aeronave apropiadamente equipada.*

e) Diagrama de Flujo del proceso de validación (véase la Figura A-1). El diagrama de flujo identifica que la FV es el paso final en el proceso de desarrollo de IFP PBN. Los objetivos primarios de la validación en vuelo es el de garantizar que la trayectoria lateral y vertical definida logre el objetivo del diseño, y que la base de datos funcione en vuelo como se ha previsto. La tripulación de vuelo de la FV anotará la existencia de cualquiera anomalía en relación con el procedimiento de vuelo, el funcionamiento del sistema de gestión de vuelo (FMS), obstrucciones, comunicaciones, vigilancia, infraestructura aeroportuaria, etc. Las evaluaciones de obstáculos, como se indica en el Doc. 8071 pueden ser completadas antes o después de la evaluación en simulador. Esta sección describe el proceso de la FV, así como los eventos, que debe ocurrir antes de la FV. Los proveedores de servicios que conducen el desarrollo y/o la validación en vuelo del IFP deben tener un sistema aprobado por la AAC para evaluar y confirmar que la integridad de los datos del FAS; la alineación del curso, la altura de cruce del umbral, y ángulo de trayectoria de planeo están proporcionando orientación para la navegación, tal como está contemplado, al umbral físico de la pista o a un punto en el espacio.

Figura A - 1


DISEÑO DEL PROCEDIMIENTO
DOCUMENTACIÓN DEL PROCEDIMIENTO
EVALUACIÓN EN SIMULADOR
(Párrafo 5)
SIMULADOR DE VUELO NIVEL C Y D (OBLIGATORIO)
VALIDACIÓN DE LA CAPACIDAD DE VUELO, CODIFICACIÓN DE LA BASE DE DATOS DE NAVEGACIÓN Y ASUNTOS DE FACTORES HUMANOS.
SIMULADOR DE ESCRITORIO (OPCIONAL)
PUEDE SER UTILIZADO PARA DETECTAR PROBLEMAS CON LA CODIFICACIÓN DE BASE DE DATOS, CAPACIDAD DE VUELO BASICA, DISEÑO DE PROCEDIMIENTO
EVALUACIÓN EN SIMULADOR SATISFACTORIA?
NO
SI
EVALUACIÓN DE OBSTÁCULOS EN TIERRA Y EN VUELO
Según Doc 8071
EVALUACIÓN SATISFACTORIA?
NO
SI
VALIDACIÓN EN VUELO
(Párrafo 5)
REQUISITOS COMPLETOS DE ESTA CA Y PARA:
PROCEDIMIENTO PÚBLICO: AERONAVE Y TRIPULACIÓN ADECUADA PBN
PROCEDIMIENTO ESPECIAL: AERONAVES PBN DE MARCA/MODELO/SERIE, INCLUYENDO UN SISTEMA DE GESTIÓN DE VUELO (FMS) EQUIVALENTE Y LA VERSIÓN DE SOFTWARE QUE UTILIZARÁ EL PROCEDIMIENTO Y LA TRIPULACIÓN
VALIDACIÓN EN VUELO SATISFACTORIA?
NO
SI
REPORTE DE LA VALIDACIÓN
IMPLEMENTACIÓN DEL PROCEDIMIENTO
LISTA DE VERIFICACIÓN / NOTAS
LISTA DE VERIFICACIÓN / NOTAS
VALIDACIÓN EN TIERRA (GV)
VALIDACIÓN EN VUELO (FV)
VALIDACIÓN

5.2 **Validación en tierra (GV)**

a) La GV debe incluir lo siguiente:

1) Revisar el paquete IFP PBN (según el Párrafo 5.1);

2) Examinar los aspectos operativos, tales como la temperatura, las limitaciones de viento, velocidades de aire, ángulo de inclinación lateral y pendientes de ascenso/descenso, etc.;

3) Verificar el diseño IFP PBN, la codificación y la información pertinentes de cartografía contra la base de datos FMS de navegación;

4) Revisar cualquier operación especial y requisitos de instrucción;

5) Discutir sobre el paquete del procedimiento con el diseñador de procedimientos, según sea necesario. Considere incluir al diseñador del procedimiento en la evaluación en simulador, especialmente cuando las consideraciones de diseño son especiales o únicas;

6) Conduzca una evaluación en simulador de escritorio (recomendado) para proporcionar una evaluación inicial de la codificación de la base de datos, capacidad de operación, y para proporcionar información a los diseñadores de procedimientos;

7) Planifique la evaluación en simulador (si es necesaria);

b) **Evaluación en simulador (aeronaves de ala fija).** Todos los IFP RNP AR APCH (SAAAR o RNP AR) deben tener una evaluación en simulador previa a la FV a menos que la AAC disponga lo contrario. Evaluaciones en simulador de otros IFP deben llevarse a cabo donde las evaluaciones de diseño especial o condiciones operacionales son deseadas.

1) Requerimientos del simulador.

(a) Para un IFP PBN público, realizar la evaluación utilizando un simulador aprobado por la AAC y calificado como Nivel "C" o nivel "D" o niveles equivalentes, que sea capaz de volar el procedimiento en condiciones operacionales normales.

(b) Para un IFP PBN especial, realizar la evaluación utilizando un simulador calificado como Nivel "C" o Nivel "D". Cuando el procedimiento está diseñado para una marca/modelo/serie específica y FMS específico, número de parte del software, versión de software y revisión, la FV inicial en simulador será realizada en un simulador con la misma configuración utilizada por el explotador en las operaciones diarias. Si por otros motivos se considera que el procedimiento es especial, como, performance en el ascenso, la FV será realizada en un simulador que sea capaz de coincidir con los requisitos del procedimiento.

(c) Las evaluaciones en simulador deben ser realizadas por las tripulaciones de vuelo que posean la formación adecuada y por los evaluadores descriptos en el Párrafo 5.6. Para un IFP PBN público, la evaluación en simulador de vuelo no requiere que las tripulaciones de vuelo sean calificadas (es decir, habilitadas en un tipo de aeronave) en cualquier simulador dado, pero deben poseer la experiencia e instrucción de los Párrafos 5.6 y 5.7.

(d) Evaluar todos los artículos que aparecen en el Formulario CA 91-012A - Lista de verificación de evaluación en simulador, véase el Apéndice 1.

(e) Los registros de la evaluación en simulador deben mantenerse. Las organizaciones que realicen evaluaciones en simulador deberán mantener una copia del Formulario CA 91-012A y enviar el formulario original a la AAC.

2) Evaluación de obstáculos. Para las evaluaciones de obstáculos llevadas a cabo durante la fase de la GV, referirse al Párrafo 5.3.b). Si es aplicable, documente la evaluación de obstáculos en tierra según el Doc 8071 Volumen 2 o documentos equivalentes, p. ej., Order 8260,19.

5.3 **Validación en vuelo.**

a) La validación en vuelo incluye dos elementos:

1) una evaluación de obstáculo e infraestructura, que si se realiza en vuelo, se podrán efectuar en cualquier aeronave; y

2) por lo menos una evaluación en curso/en trayectoria de planeo en vuelo del procedimiento propuesto en una aeronaves PBN apropiada. Estos dos elementos se pueden realizar por separado, y en diferentes aviones, sin embargo, la evaluación de obstáculos siempre se llevará a cabo antes de la evaluación en curso/en trayectoria de planeo. La FV debe llevarse a cabo por las tripulaciones de vuelo calificadas y capacitadas (para los requisitos específicos, consulte los Párrafos 5.6 y 5.7). La FV debe llevarse a cabo en curso/en trayectoria de planeo durante el día en condiciones meteorológicas visuales (VMC), excepto por lo señalado en los Párrafos 5.3.c).2). La FV se limita a miembros de la tripulación esenciales (mínimo dos) y no debe llevarse a cabo durante operaciones comerciales.

Nota.- *Las evaluaciones de obstáculos e infraestructura se llevan a cabo de acuerdo con el Doc. 8071 Volumen 2 y pueden ser realizadas en la fase de validación en tierra.*

b) **Evaluaciones de obstáculos.** Se llevarán a cabo de acuerdo a las directrices establecidas en el Doc. 8071 o documentos equivalentes, p. ej., Order 8200.1.

1) Las actividades de vuelo de la evaluación de obstáculos deben cumplir con las reglas de vuelo que figuran en el LAR 91 o documentos equivalentes.

2) Cualquier desviación de una reglamentación durante una evaluación de obstáculos debe ser autorizada por la AAC.

3) Deberán registrarse utilizando un Sistema de Grabación Autónomo de Sistema de Posicionamiento Global (AGRS) u otro sistema adecuado aprobado por la AAC. Por ejemplo, la Organización de Navegación Aérea, Operaciones Técnicas, la AAC puede seguir utilizando el Sistema de inspección automática de vuelo (AFIS). Este sistema captura de manera electrónica todos los elementos señalados anteriormente.

Nota.- *La Administración de Aviación Civil seguirá encargándose de registrar y almacenar los registros de la inspección de vuelo de los procedimientos de vuelo por instrumentos que produce o evalúa y serán exentos de los registros requeridos que figuran en el Párrafo 5.4.a) 3).*

4) Evaluar y completar el Formulario CA 91-012B, lista de verificación de evaluación de obstáculos, véase Apéndice 1.

c) **La preparación de la validación en vuelo y procedimientos** deben incluir lo siguiente:

1) Preparación del pre-vuelo:

(a) revisar los resultados del simulador de vuelo y las evaluaciones de los obstáculos;

(b) cargar el IFP PBN en un AGRS. Los datos deben coincidir con la información contenida en el paquete de desarrollo de procedimientos y gráficos de procedimientos;

(c) revisar el paquete del IFP PBN según las directrices establecidas en el Doc. 8071;

(d) verificar la documentación del IFP PBN contra la base de datos de navegación de las aeronaves; y

(e) familiarizarse con cualquier instrucción específica, operacional o requisitos de equipo.

2) Para aprobación de mínimos nocturnos - los procedimientos desarrollados para los aeródromos, helipuertos, a un punto en el espacio (PinS) sin servicios ni procedimientos de reglas de vuelo por instrumentos (IFR), a las pistas de nueva construcción, y los procedimientos a pistas alargadas o acortadas requieren una evaluación nocturna para determinar la adecuación de los sistemas de iluminación del aeródromo, antes de

autorizar los mínimos de noche. Conducir la evaluación nocturna durante VMC y después de cumplir los requisitos de este párrafo

3) La partes de la validación en curso/en trayectoria de planeo en vuelo del IFP que están por encima de una altura mínima publicada IFR podrán ser realizadas en la noche y/o en condiciones meteorológicas instrumentales (IMC) [por ejemplo, las partes de alto nivel de las salidas normalizadas por instrumentos (SID) o llegadas normalizadas por instrumentos (STAR)].

4) Registre utilizando un AGRS tal como se define en el presente documento.

5) Cuando se realice el vuelo de validación del IFP: Un sistema de datos de vuelo que permita la recolección en vuelo o un análisis post-vuelo para validar que los elementos de los datos FAS para la alineación del curso, la altura de cruce del umbral, y el ángulo de trayectoria de planeo están proporcionando orientación para la navegación, como fue diseñado, al umbral físico de la pista o a un punto en el espacio. Se debe prestar especial atención a la exactitud de los datos en casilla de datos del FAS debido a la corrupción de los datos de altura elipsoide. El sistema debe ser capaz de realizar las evaluaciones necesarias en un documento, de manera cuantitativa.

6) Evaluar y completar el Formulario CA 91-012C, Lista de verificación del vuelo de validación (véase el Apéndice 1).

5.4 **Registro de la validación en vuelo**

a) Las organizaciones mantendrán el Formulario original CA 91-012C (véase el Apéndice 1) y enviarán una copia a la AAC. Los registros deben incluir:

1) el Formulario original CA 91-012B (véase el Apéndice 1) firmado y completado;

2) el Formulario original CA 91-012C (véase el Apéndice 1) firmado y completado;

3) Proveer el archivo AGRS electrónico (compatible con los sistemas informáticos de la AAC) tanto de la evaluación de obstáculos y la validación en vuelo a la AAC. Presentar el informe, en conjunto con el paquete de procedimientos. El informe debe contener, como mínimo, los siguientes elementos:

(a) fecha y hora de procesamiento;

(b) el número máximo de satélites;

(c) número mínimo de satélites;

(d) promedio de la dilución de precisión de la posición (PDOP);

(e) para cada segmento, la altitud máxima y mínima, la velocidad con respecto al suelo, razón de ascenso y la pendiente de ascenso;

(f) gráficos impresos con detalle suficiente que representen la trayectoria volada con referencia a la trayectoria deseada del procedimiento de aproximación, incluyendo los puntos de referencia del procedimiento.

4) **FV - Requisitos de aeronaves PBN.**

(a) El avión debe poseer la capacidad de volar la trayectoria del IFP prevista en operaciones normales.

5.5 **Calificaciones de la tripulación.**

a) La tripulación de vuelo y los evaluadores para las actividades de validación IFP PBN y especial, deben ser autorizados por la AAC y cumplir con los siguientes requisitos:

1) **Piloto.-** El piloto al mando debe ser calificado en la aeronave apropiada y completar la instrucción específica descrita en el Párrafo 5.7.

2) **Co-piloto.-** El copiloto debe ser calificado en la aeronave apropiada y completar la instrucción específica descrita en el Párrafo 5.7.

3) **Evaluador.-** El evaluador es un inspector calificado de la Autoridad [operaciones/ aviónica] o una persona con calificaciones equivalentes y experiencia a las del piloto autorizado por la AAC. Todos los evaluadores deben completar el programa de instrucción especificado en el Párrafo 5.7.

4) **Calificación inicial de validación en vuelo (vigilancia de la Administración de Aviación Civil).**

5.6 **Instrucción para el proveedor de servicios de validación en vuelo**

a) Un proveedor de servicios de FV que no tiene un programa de instrucción aprobado por la AAC, requiere completar un programa de instrucción aprobado de validación en vuelo que incluya lo siguiente:

1) **Familiarización con el proceso de diseño IFP PBN y requisitos** para las operaciones PBN. Los requisitos para las operaciones PBN están descriptos en los siguientes documentos:

(a) Doc 9613 Manual de navegación basada en la performance (PBN);

(b) CA 91-009 Aprobación de aeronaves y explotadores para operaciones de aproximación RNP con autorización obligatoria.

(c) Doc. 9905 Manual de diseño de procedimientos de performance de la navegación requerida con autorización obligatoria (RNP AR);

(d) Doc 8168 Procedimientos para los servicios de navegación;

(e) Doc 9368 Manual de construcción de procedimientos de vuelo por instrumentos;

(f) Doc 9625 Manual de criterios para calificar los simuladores de vuelo;

(g) Doc 9157-AN/901 Manual de diseño de aeródromos;

2) **Conocimiento de los criterios de diseño de procedimientos** que corresponda al tipo de IFP para el cual el individuo está autorizado para llevar a cabo, ya sea como piloto al mando o evaluador;

3) **Instrucción en la operación y en el procesamiento** posterior de los datos (sólo para tripulación de FV);

4) **Proceso para completar los formularios**, AC 91-012A, AC 91-012B, AC 91-012C, y el proceso para proporcionar retroalimentación a los diseñadores del procedimiento;

5) **Requisitos de la validación en vuelo**;

6) **Revisión** del paquete del procedimiento;

7) **Requisitos, técnicas y consideraciones** para verificar que los datos de navegación publicados, así como los utilizados en el diseño del procedimiento, son correctos;

8) **Técnicas y consideraciones para la validación de los datos de los obstáculos;**

9) **Evaluación de la infraestructura del aeródromo;**

10) **Cobertura de comunicaciones;**

11) **Capacidad de operación/evaluación de los factores humanos;**

12) **Uso de herramientas de automatización y de simuladores o validación en tierra;**

13) **Consideraciones cartográficas;**

14) **Factores operacionales;**

15) **Supervisión adecuada de la instrucción práctica en el puesto de trabajo (OJT)** para alcanzar el nivel requerido de competencia en las técnicas de evaluación de obstáculos, evaluación de simulador y validación de vuelo.

5.7 **Entrenamiento periódico**

a) Para las tripulaciones de vuelo, el entrenamiento periódico se llevará a cabo cada *dos* años, y se incluye lo siguiente:

1) **La actualización sobre los cambios pertinentes a los criterios de diseño;**

2) **El conocimiento y habilidades relacionadas con los nuevos avances en la FV;**

3) Revisión de las habilidades requeridas para la FV señalada en el Párrafo 5.6.

PÁGINA DEJADA INTENCIONALMENTE EN BLANCO

APÉNDICE 1

LISTAS DE VERIFICACIÓN

Los Formularios AC 91-012A, AC 91-012B y AC 91-012C en este apéndice se utilizarán para la evaluación en simulador, la evaluación de obstáculos, y la validación en vuelo (FV). El apéndice contiene también una descripción de la información que debe incluirse en cada casilla de los tres formularios.

El formulario original firmado y completado por la evaluación en simulador, la evaluación de obstáculos, y la validación en vuelo debe ser proporcionado a la Administración de Aviación Civil (AAC) y las copias retenidas por la organización que realizó la FV.

CASILLA 1. Fecha	**Ingrese la fecha del vuelo**
CASILLA 3. Organización	**Ingrese la organización o el nombre del explotador (es decir, XXX Airlines, etc.)**
CASILLA 5. Aviones, Marca, Modelo, Serie	**Ingrese el tipo de aeronave utilizada para realizar la validación.**
CASILLA 7. Procedimiento	**Ingrese el nombre del procedimiento que se está verificando (p. ej., RNAV (RNP) RWY 18).**
CASILLA 9. FM/Software	**Ingrese el FMS (o GNSS) y software utilizados para validar el procedimiento.**
CASILLA 10. Nombre PIC/Teléfono	**Escriba el nombre y número de teléfono del piloto al mando que realizará la validación en vuelo.**
CASILLA 11. Nombre del evaluador/Teléfono	**Escriba el nombre y número de teléfono del evaluador.**
CASILLA 12. Revisión de notas del simulador de vuelo	**Revise las notas de las listas de verificación previas (evaluación de obstáculos y evaluaciones en simulador de vuelo). Preste especial atención a las notas del procedimiento en la CASILLA 49 y considere / verifique durante la validación en vuelo**
CASILLA 13. Base de datos de navegación y comparación de la fuente	**Compare los datos de origen contenidos en la CA 91-012, serie de formatos, paquete de distribución de objetivos, o cualquier otro paquete de distribución oficial de los datos cargados en el FMC. Es aceptable completar esta comparación antes de la conducción de la validación en vuelo comparando el archivo del informe de la base de datos de navegación electrónica contra los datos de la fuente oficial. Asegúrese que las fechas de vigencia y los**

	identificadores de la base de datos de navegación del archivo del informe concuerden con la base de datos de navegación real utilizada para realizar la validación en vuelo e ingrese los identificadores de la base de datos de navegación utilizados en esta casilla. **En este paso, es importante validar la latitud/longitud de los puntos de recorrido (WPT), longitudes de los tramos, rumbo de los tramos, altitudes, velocidades y ángulos de la trayectoria de vuelo. Para los segmentos que contienen tramos con arco de radio constante hasta un punto de referencia (RF), se debe asegurar que las distancias de arco mostradas concuerden con los datos de la fuente.**
CASILLA 14. Calibración de los equipos de vuelo y de tierra	**Antes de la validación en vuelo, calibre la aeronave y los equipos de apoyo en tierra.**
CASILLA 15. Procedimiento a ser volado hasta la DA	**Vuele el procedimiento hasta la DA para evaluar la capacidad de vuelo y el franqueamiento de obstáculos (verificación de obstáculos y evaluación en simulador solamente).**
CASILLA 16. Archivo de los datos de simulación	**Registre y guarde los datos de simulación disponibles (es decir, latitud/longitud, altitud y velocidad de registros) para el análisis posterior en simulador.**
CASILLA 17. Procedimiento más rápido/lento que las cartas	**Vuele el procedimiento con una velocidad más rápida y más lenta que la velocidad de las cartas para verificar la capacidad de vuelo y alertas del sistema de advertencia de la proximidad del terreno que tenga una función de predicción de riesgos del terreno (EGPWS/TAWS). Tenga en cuenta la gama de velocidades de vuelo en el Casilla 49.**
CASILLA 18. Tramos INICIAL/INTERMEDIO volados a ½ del margen requerido de franqueamiento de obstáculos (ROC)	**Vuele todos los tramos de la aproximación inicial e intermedia a un valor de ½ del ROC para cada segmento a fin de analizar el terreno y obstáculos (por ejemplo, 500 pies por debajo para el segmento inicial y 250 pies por debajo para el segmento intermedio).**

CASILLA 19. Tramos INICIAL/INTERMEDIO volados en los límites de alerta	**Evalúe el procedimiento en los límites laterales de acuerdo con el Doc 8071. Realice esto para los procedimientos nuevos, así como para los procedimientos con obstáculos cuestionables o en terreno/espacio aéreo que impone desafíos.**
CASILLA 20. Verifique marcas/características apropiadas del aeródromo	**Evalúe la idoneidad del aeródromo para apoyar el procedimiento. Preste especial atención a las marcas confusas del aeródromo, ayudas confusas de iluminación o no estándar, o falta de comunicaciones. Asegúrese de que los ángulos del indicador de pendiente de planeo visual (VGSI) aparezcan como están previstos o trazados.**
CASILLA 21. Comunicaciones aire/tierra	**Las comunicaciones con el control de tránsito aéreo (ATC) deben ser satisfactorias a la altitud mínima del punto de referencia de aproximación inicial (IAF) y en la altitud de aproximación frustrada**
CASILLA 22. Cobertura radar	**Asegúrese que la cobertura radar está disponible para todas las partes del procedimiento, cuando es requerido.**
CASILLA 23. Carta con suficiente detalle	**Verifique para asegurarse que la carta tiene suficiente detalle como para navegar e identificar terreno considerable u obstáculos.**
CASILLA 24. Aproximación frustrada con RNP < 1.0	**Si la aproximación frustrada requiere RNP menor que 1.0, asegúrese que hay una observación en la sección de notas (p. ej., "la aproximación frustrada requiere RNP menor que x.xx ").**
CASILLA 25. Tramos RF	**Si el procedimiento requiere tramos RF en cualquier punto, estos requisitos se indican en la sección de notas de la carta de aproximación (por ejemplo, "RF requerido") o, para transiciones, específicas junto al IAF en el plano de vista.**
CASILLA 26. Obstáculos verificados a través de:	**Indique si se utilizó en tierra observación complementaria para verificar los obstáculos de control encerrando en un circulo las palabras SI o NO.**
CASILLA 27. Velocidades o pendientes de ascenso no estándar	**Cualquier excepción a las pendientes de ascenso estándar (200 ft/NM) o**

	velocidades deberá ser listada en la sección de notas de la carta de aproximación (por ejemplo, "requiere pendiente de ascenso en la aproximación frustrada de xxx ft/NM a xxxx ").
CASILLA 28. Capacidad de vuelo	**Documente la capacidad general de vuelo del procedimiento. Esto debe incluir cualquier asunto de factores humanos que pueden ser causados por el diseño del procedimiento.**
CASILLA 29. Límites de temperatura	**Verificar los límites de temperatura alta y baja identificadas en la sección de notas de la carta. (p. ej., "Para los sistemas baro-VNAV no compensados, Procedimiento no disponible (NA) por debajo de -5C (23F) o por encima de 40C (104F) ").**
CASILLA 30. Pérdida de RAIM/RNP/Interferencias de radio frecuencias (RFI)	**Documente si una pérdida de RAIM, RNP, o si las RFI se detectaron durante la validación en vuelo.**
CASILLA 31. Tamaño de la aeronave	**Asegúrese que en la carta de aproximación están anotadas las restricciones de tamaño de las aeronaves aplicables (p. ej., "Procedimiento NA para aeronaves con una envergadura superior a 136 ft").**
CASILLA 33. Derrotas en vuelo son iguales a las de la carta	**Asegúrese que la carta presenta el procedimiento con precisión y que se interpreta fácilmente. Asegúrese que las derrotas de vuelo concuerden con las derrotas de la carta y que llevan a la aeronave hacia el punto deseado previsto.**
CASILLA 35. Segmento de rumbo	**Verificar que el curso verdadero y magnético al siguiente punto de recorrido (WPT) indicado en el FMS o GNSS refleja con precisión el diseño del procedimiento. La tolerancia aceptable es de ± 1°. Los valores fuera de tolerancia deben ser resueltos con el diseñador del procedimiento.**
CASILLA 37. Distancia de los tramos	**Verifique que las distancias de los tramos indicadas por el sistema de navegación de las aeronaves reflejen con precisión el diseño del procedimiento. La tolerancia aceptable**

	es de ± 0.1 nm. Los valores fuera de tolerancia se deben resolver con el diseñador del procedimiento. NOTA: Asegúrese de no confundir la distancia al próximo punto de referencia, con el radio del tramo RF presentado por algunos sistemas. Para obtener las distancias exactas entre los puntos de recorrido (WPT) en un tramo RF, puede ser necesario examinar el archivo del reporte de la base de datos de navegación antes de la validación en vuelo (véase la Casilla 13).
CASILLA 39. Angulo de trayectoria de vuelo (FPA)	**Verifique que el ángulo de trayectoria de vuelo (FPA) que se indica en el FMS o GNSS refleje con precisión el diseño del procedimiento.**
CASILLA 41. Longitud del tramo	**Verifique que el espaciamiento del punto de recorrido (WPT) es suficiente para permitir que la aeronave se estabilice en cada tramo sin eludir los puntos de recorridos/tramos. La longitud del tramo debe ser suficiente para permitir que la aeronave desacelere o cambie de altitud si es necesario.**
CASILLA 43. Advertencia/Alerta del EGPWS / TAWS	**Indique cualesquiera advertencias o alertas del EGPWS/TAWS. Registre los detalles de la alerta incluyendo lat/long, configuración de la aeronave, velocidad y altitud en la sección de comentarios.**
CASILLA 44. Verifique los obstáculos de control (controlling obstacle)	**Los obstáculos de control deben ser confirmados en vuelo o mediante observación en tierra. Si el obstáculo es listado como terreno, árboles u obstáculo que se asume como adverso (AAO), no será necesario verificar cual árbol es de control, sólo que ningún obstáculo artificial más alto esté presente en el espacio aéreo protegido. Si falta algún obstáculo o se observa nuevos obstáculos registre la lat/long o radial/rumbo del obstáculo en la sección de notas del procedimiento.**
CASILLA 45. Componente del viento	**Registre la componente del viento o el viento real del tramo volado. Utilice como guía el Doc. 9905 de OACI o**

	documento equivalente para la determinación de la configuración del viento en el simulador de vuelo.
CASILLA 47. Angulo de inclinación lateral máximo en tramos RF	**Ingrese el ángulo de inclinación lateral máximo visto en el tramo RF. Registre cualquier ángulo mayor de 25 grados en la sección de notas.**
CASILLA 49. Notas del procedimiento	**Utilice esta sección para enumerar las recomendaciones del procedimiento, así como cualquier inquietud acerca del control y alerta de la performance de a bordo RNP, carga de trabajo de la tripulación, obstáculos no evaluados, factores humanos, desviaciones laterales o verticales, capacidad de vuelo, codificación de la base de datos o procedimientos operacionales de la tripulación de vuelo. Haga una nota especial si el vuelo se realiza durante horas de la noche.**
CASILLA 51. Procedimiento SAT/INSAT	**Encierre en un círculo SAT si el procedimiento cumple con todos los requisitos. Encierre en un círculo INSAT si el procedimiento es insatisfactorio y no cumple todos los requisitos y/o identifica cuestiones específicas que necesitan ser corregidas. Anote cuestiones específicas en la Casilla 49.**
CASILLA 53. Firma del evaluador	**Firma del evaluador**

Formulario CA 91-012A

ADMINISTRACIÓN DE AVIACIÓN CIVIL
EVALUACIÓN EN SIMULADOR

1-FECHA		3-ORGANIZACIÓN		5-TIPO DE AERONAVE	
7-PROCEDIMIENTO			9-FMS/SOFTWARE		
10-PIC NOMBRE/TELÉFONO		11-NOMBRE/TELÉFONO DEL EVALUADOR			

TAREAS DE EVALUACIÓN EN SIMULADOR	SI	NO
13-FMC DATOS DE NAV Y COMPARACIÓN DE ORIGEN		
15-PROCEDIMIENTO A 100' POR DEBAJO DEL DA/MDA		
16-GRABAR Y GUARDAR DATOS DE SIMULACIÓN		
17- PROCEDIMIENTO MAS RÁPIDO/LENTO QUE EN LA CARTA		
28- CAPACIDAD DE VUELO		

LISTA DE GRÁFICOS	SI	NO
23-CARTA POSEE SUFICIENTES DETALLES		
24-RNP <1.0 EN APROXIMACIÓN FALLIDA		
25- RF NOTAS DE TRAMOS		
27-VELOCIDAD DE ASCENSO NO ESTÁNDAR		
29-NOTAS DE TEMPERATURA LIMITE		
31-NOTAS DE TAMAÑO DE LA AERONAVE		
33- DERROTAS CONCUERDAN CON LA CARTA		

VERIFICACIÓN DE SEGMENTOS

	FEEDER		INICIAL		INTERMEDIO		FINAL		FALLIDA		HOLDING	
35- SEGMENTO DE RUMBO (S)	APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ	
37- SEGMENTO DE DISTANCIA	APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ	
39- ÁNGULO DE TRAYECTORIA DE VUELO (FPA)							APROBÓ / FALLÓ					
41- LONGITUD DEL SEGMENTO	APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ		APROBÓ / FALLÓ	
43- ALERTA EGPWS/TAWS	SI / NO		SI / NO		SI / NO		SI / NO		SI / NO		SI / NO	
45- COMPONENTE DE VIENTO												
47- ÁNGULO MÁXIMO DE INCLINACIÓN LATERAL												

49- NOTAS DE PROCEDIMIENTOS	

51- PROCEDIMIENTO: SAT / INSAT

53-FIRMA DEL EVALUADOR _____

Formulario CA 91-012A

Formulario CA 91-012B

ADMINISTRACIÓN DE AVIACIÓN CIVIL
EVALUACIÓN DE OBSTÁCULOS

1-FECHA		3-ORGANIZACIÓN		5-TIPO DE AERONAVE	
7-PROCEDIMIENTO			9-FMS/SOFTWARE		
10-PIC NOMBRE/TELÉFONO		11-NOMBRE/TELÉFONO DEL EVALUADOR			

TAREAS DE EVALUACIÓN EN SIMULADOR	**SI**	**NO**
14-EQUIPO CALIBRADO DE TIERRA Y VUELO		
15- PROCEDIMIENTO A 100' POR DEBAJO DEL DA/MDA		
18- EVALUACIÓN INICIAL/INTERMEDIA A ½ DEL ROC		
19- VUELO EN LOS LÍMITES DE ALERTA		
20- VERIFICAR LAS MARCAS APROPIADAS DE LA PISTA		
21- COMUNICACIÓN DE TIERRA/AIRE		
22- COBERTURA ADECUADA DE RADAR		
30- PERDIDA DE RAIM/RNP/RFI		

VERIFICACIÓN DE SEGMENTOS

	FEEDER		INICIAL		INTERMEDIO		FINAL		FALLIDA		HOLDING	
43- ALERTA EGPWS/TAWS	SI	NO	SI	NO	SI	NO	SI	NO	SI	NO	SI	NO

49- NOTAS DE PROCEDIMIENTOS	

51- PROCEDIMIENTO: SAT / INSAT

53-FIRMA DEL EVALUADOR _____

Formulario CA 91-012B

Formulario CA 91-012C

ADMINISTRACIÓN DE AVIACIÓN CIVIL
EVALUACIÓN EN VUELO

1-FECHA		3-ORGANIZACIÓN		5-TIPO DE AERONAVE	
7-PROCEDIMIENTO		9-FMS/SOFTWARE			
10-PIC NOMBRE/TELÉFONO		11-NOMBRE/TELÉFONO DEL EVALUADOR			

TAREAS DE EVALUACIÓN EN SIMULADOR	SI	NO
12-REVISIÓN DE NOTAS DE EVALUACIÓN SIMULADOR/OBSTÁCULO		
13-FMC DATOS DE NAV Y COMPARACIÓN DE ORIGEN		
14-EQUIPO DE TIERRA Y VUELO CALIBRADO		
28-CAPACIDAD DE VUELO		
30- PÉRDIDA DE LA RAIM		

LISTA DE GRÁFICOS	SI	NO
23-CARTA POSEE SUFICIENTES DETALLES		
24-RNP <1.0 EN APROXIMACIÓN FRUSTRADA		
25- RF NOTAS DE TRAMOS		
27-VELOCIDAD DE ASCENSO NO ESTÁNDAR		
29-NOTAS DE TEMPERATURA LÍMITE		
31-NOTAS DE TAMAÑO DE LA AERONAVE		
33- LA CARTA CONCUERDA CON LA DERROTA DE VUELO		

VERIFICACIÓN DE SEGMENTOS

	FEEDER		INICIAL		INTERMEDIO		FINAL		FALLIDA		HOLDING	
37- SEGMENTO DE DISTANCIA	APROBÓ	FALLÓ	APROBÓ	FALLÓ	APROBÓ	FALLÓ	APROBÓ	FALLÓ	APROBÓ	FALLÓ	APROBÓ	FALLÓ
39- ANGULO DE TRAYECTORIA DE VUELO (FPA)							APROBÓ	FALLÓ				
41- LONGITUD DE SEGMENTO	APROBÓ	FALLÓ	APROBÓ	FALLÓ	APROBÓ	FALLÓ	APROBÓ	FALLÓ	APROBÓ	FALLÓ	APROBÓ	FALLÓ
43- ALERTA EGPWS/TAWS	SI	NO	SI	NO	SI	NO	SI	NO	SI	NO	SI	NO
45- COMPONENTE DE VIENTO												
47- ÁNGULO DE INCLINACIÓN LATERAL												

49- NOTAS DE PROCEDIMIENTOS	

51- PROCEDIMIENTO: SAT/INSAT

53-FIRMA DEL EVALUADOR _____

Formulario CA 91-012C

Agenda Item 5: Air Traffic Flow Management Implementation (ATFM) in the SAM Region

5.1 The Meeting recalled that the SAM/IG Workshops/Meetings, amongst other things, analysed the topics related to ATFM implementation in the South American Region and related activities.

5.2 From the discussions on this matter, the SAM/IG/6 Meeting agreed on the need to review a number of tasks contained in the ATFM action plan, and requested the Secretariat to take action to that they could be implemented within the framework of Regional Project RLA/06/901, as applicable.

Course on runway and ATC sector capacity calculation

5.3 Amongst the tasks to be carried out, the Meeting identified the need to conduct another course on Runway and ATC Sector Capacity for SAM States, in order to train more people on the calculation of runway and ATC sector capacity. Some countries have already done the calculation for an airport, as an exercise, but it must be done for the other airports and ATC sectors. The Secretariat is requested to consider the inclusion in Project RLA/06/901 of a course on Runway and ATC Sector Capacity to be held during the first half of 2011.

Amendment to the ATFM Manual

5.4 The Meeting analysed the amendments introduced to the ATFM Manual by three consultants from Colombia and Brazil during the period 4-15 October 2010. As a result of the analysis, it was concluded that the changes introduced improved the understanding of the document, and thus the proposed changes were approved. The Meeting also agreed to request the Secretariat to submit the ATFM Manual to the Second Meeting of the GREPECAS CNS/ATM Subgroup for its analysis and final approval. The amended ATFM Manual appears in **Appendix A** to this part of the report.

Inclusion of the exchange of ATFM messages in the ATFM Manual

5.5 The Group agreed that the study for the inclusion of the exchange of ATFM messages in the ATFM Manual should be conducted after the ATFM and CDM course to be held in Brazil in November 2010. The Secretariat is requested that, once that analysis has been completed, it be sent to the SAM/IG/7 meeting for review.

Manual on Collaborative Decision-Making (CDM) for ATFM

5.6 As foreseen in the ATFM implementation action plan, during the aforementioned period, the consultants developed a CDM Manual for use in the South American Region. The CDM Manual was also analysed and the Meeting felt that it met the current requirements of the SAM Region. Accordingly, it was approved for its application in the Region. The Secretariat was also requested to submit the cited document to the Second Meeting of the GREPECAS CNS/ATM Subgroup for its analysis, and to study the possibility of its application in the CAR Region, in order to harmonise the ATFM implementation process in both Regions. Finally, the Meeting agreed to formulate the following conclusion:

Conclusion SAM/IG/6-7 Manual on Collaborative Decision-Making (CDM) for ATFM

That SAM States adopt the Manual on Collaborative Decision-Making (CDM) for ATFM shown in **Appendix B** to this part of the report.

ATFM Teleconferences

5.7 The ATFM Implementation Group had considered that, starting at the SAM/IG/6 meeting, the possibility of SAM States holding daily teleconferences should be analysed. The Meeting felt that the States, for various reasons, were not yet prepared to hold such daily conferences, but agreed that weekly ATFM teleconference should be held amongst flow management units or flow management positions (FMU/FMP), as had been established at the SAM/IG/5 meeting, in order to improve the exchange of information amongst the participating States.

5.8 However, Brazil and Venezuela agreed to hold daily teleconferences starting 6 December 2010 at 15:00 UTC, except on Wednesdays, in which 14:00 UTC would be maintained.

5.9 The Meeting requested the States participating in the teleconferences that, in addition to exchanging the forms containing the information of each State, live telephone contact be maintained according to the approved programme, so as to maintain the concepts established at the SAM/IG/5 meeting that led to the use of teleconferences.

Revision and updating of the ATFM Implementation Action Plan

5.10 The participants at the Meeting analysed the plan for the implementation of ATFM at the airports and airspace (ATC sectors) of the Region, which contemplates tasks to be carried out by given dates and by the specified responsible parties. To this end, **Appendix C** to this part of the report shows the tasks that have been completed, and *Appendix B to Agenda Item 1* contains an update of the table for the follow-up of pending ATFM conclusions and tasks of the SAM/IG meetings.

Studies conducted in ATC sectors of the Brazilian FIRs

5.11 Brazil presented information on the results of the studies conducted in the ATC sectors of its FIRs. The Meeting felt that the information presented was very valuable and decided to include it as **Appendix D** to this part of the report.

ATFM AIP SUPP/AIC model

5.12 The Meeting analysed the ATFM SUPP AIP/AIC model presented to the Meeting and considered that it met the requirements established in the action plan. Accordingly, the model for the implementation of the air traffic flow management (ATFM) service in the SAM Region was approved. Likewise, SAM States were requested to use it as guidance material when drafting their national AIC. In this respect, the Meeting formulated the following conclusion:

Conclusion SAM/IG/6-8 ATFM AIP SUPP/AIC MODEL

That the States of the ICAO South American Region, when preparing their national AIC, use as a reference the ATFM AIP SUPP/AIC model shown in **Appendix E** to this part of the report.

APPENDIX A

CARIBBEAN/SOUTH AMERICAN AIR TRAFFIC FLOW MANAGEMENT MANUAL

(CAR/SAM ATFM MANUAL)

Version 1.1	
Date	**October 2010**

FOREWORD

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

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

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

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The present edition (Draft Version 1.0) includes all revisions and modifications until October 2010. Subsequent amendments and corrigenda will be indicated in the Record of Amendment and Corrigenda Table, according to the procedure established in page X.

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Chapter 1: Background

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

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

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

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

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

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

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

Chapter 2: Purpose of the Document

2.1 The purpose of this document shall be to assist the States/Territories of the CAR/SAM Regions to establish a common understanding of the role of each of the parties involved in the effective provision of the flow management service, air traffic services, and aircraft operators, taking into account the optimization in the use of the resources available for an adequate response in order to ensure the quality of the service and the efficiency of the ATM system (capacity management).

2.2 This document presents the terms, techniques and programs related to ATFM, the purpose of which is to enable, during all flight phases, a safe, economic, fluid and orderly traffic flow, by providing air traffic management services of a nature and magnitude that meet the requirements of all users and all areas of the airspace.

2.3 The intent of this document is to serve as guidance for the implementation of the ATFM service and not as a comprehensive body of knowledge.

2.4 It is understood that this will be considered a living document that will be modified as needed to reflect the growth, future needs and harmonization of the CAR/SAM Regions.

Chapter 3: Introduction

3.1 The Air Traffic Flow Management Operational Concept for the Caribbean/South American Regions (CAR/SAM ATFM CONOPS) establishes a simple implementation strategy. It is recommended that this strategy be developed in phases, so as to ensure maximum utilization of the available capacity and enable all concerned parties to obtain sufficient experience.

3.2 The experience acquired in other Regions and by some States of the CAR/SAM Regions permits States/Territories and International Organizations to apply basic ATFM procedures at airports, without the immediate need for a Regional ATFM Centre. A Regional ATFM Centre will require extensive studies to define operational concepts, system requirements and institutional aspects for ATFM implementation in the CAR/SAM Regions.

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

3.4 In the future, in order to maximize the operational efficiency of airspaces and airports of the Region, consideration should be given to the establishment of a Centralized ATFM unit(s) to oversee for provision of the ATFM service.

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

Chapter 4: ATFM Implementation Strategy

4.1 Airport and airspace monitoring

4.1.1 In order to decide on the implementation of the ATFM service, airports and airspaces should start being monitored in order to identify significant increases in ground delays and in-flight holding, as well as bottlenecks (ATC sector, runway, apron and airport facilities).

Note: The different States could develop mechanisms and procedures to measure ground delays and in-flight holding.

4.2 Determining capacity

4.2.1 Airport and ATC sector capacity should be determined through the use of recognised measurement and calculation methodologies such as the "GUIDE FOR THE APPLICATION OF A COMMON METHODOLOGY FOR ESTIMATING AIRPORT AND ATC SECTOR CAPACITY IN THE SAM REGION" (approved at the SAMIG/5 meeting).

Note: The different States could develop their own measurement and calculation methodologies according to the requirements and conditions of their operational environment.

4.3 Analysis of air traffic demand

4.3.1 In order to determine and prioritise the need to implement the ATFM service, air traffic demand should be assessed and compared to the calculated capacity.

4.4 Capacity statement

4.4.1 In order to begin the application of ATFM measures at airports and the airspace, the air navigation service provider (ANSP) shall officially declare its capacity, clarifying that it could vary based on possible operational limitations (airport infrastructure, CNS or foreseen meteorological conditions), and which will be called "available capacity".

Chapter 5. Preliminary ATFM Measures

5.1 As established in the ATFM implementation strategy under the Air Traffic Flow Management Operational Concept for the Caribbean/South American Regions (CAR/SAM ATFM CONOPS), the adoption of preliminary ATFM measures at the airports located in low air traffic density airports are easy to apply, taking into account that they only require the gathering of information on flight intention (RPL, Official Airline Guide (OAG), flight forms, etc.). This process should consider the development of mechanisms for the strategic coordination of airport slots for scheduled operators, mainly aimed at ensuring airport demand and capacity balancing. The application of such slot coordination processes would ensure an effective hourly distribution of scheduled flights at the airports and would determine the capacity and slots available for non-scheduled operators.

5.2 Additionally, pre-tactical and tactical airport slot assignment processes should be implemented at high traffic density airports for non-scheduled operators.

5.3 For the application of preliminary ATFM measures, it would be advisable to implement capacity management programs (ATFCM) within the framework of the collaborative decision-making (CDM) concept, with a view to coordinating foreseeable capacity reductions (scheduled maintenance work) or addressing a significant growth in demand in face of a limited capacity during certain periods of time.

5.4 In case the preliminary ATFM measures at airports are not enough to prevent congestion and saturation of the associated airspaces, ATFM measures should be implemented during the pre-tactical and tactical planning phases, requiring more sophisticated computer tools and infrastructure to identify and avoid overload at airspace sectors and airports.

Note: See Appendix E, which shows and describes a simple format for assessing demand as required for the implementation of preliminary ATFM measures and for the development of strategic planning programs by the ATFM authority.

Chapter 6. Concepts to be taken into account for ATFM Implementation

6.1 ATFM will be established to optimize the use of available airspace and airport capacity and to improve air traffic flow management processes. It will be based on transparency and efficiency, ensuring a flexible and timely capacity, in keeping with ICAO guidelines.

6.1.1 The implementation will promote cooperation among air navigation service providers, airport operators and airspace users, and will cover the following areas:

a) Flight planning.

b) The use of available airspace capacity during all flight phases.

c) The drafting of guidelines to optimise air traffic flow.

6.1.2 The implementation will seek a balance between the financial benefits for stakeholders, derived from the safety improvements expected from the relevant parties, and the operational and technical benefits, taking into account the requirements for a globally inter-operative ATM.

6.1.3 Aircraft exempt from ATFM measures

6.1.3.1 The following status aircraft operations will be excluded from the implementation of ATFM initiatives:

a) State aircraft (according to national regulations)

b) Emergency/priority aircraft

c) Hospital flights

d) Humanitarian flights (ambulance flights)

e) Search and rescue missions

f) Transportation of human organs

Note: For more details, see the Air Traffic Flow Management Operational Concept for the Caribbean/South American Regions (CAR/SAM ATFM CONOPS).

6.1.4 It shall be recognized that the airspace and airports are resources shared by all user categories under equal and transparent conditions, taking into account State safety requirements and the commitments of international organizations.

6.1.5 Air traffic flow management should be based on partnership principles in order to meet ATM expectations through collaborative decision-making (CDM) among:

a) Central flow management units (CFMU)

b) Flow management units (FMU/FMP)

c) Airspace users: general aviation, air carriers, military forces

d) The airport community

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

6.1.7 ATFM will be applied within CAR/SAM airspace and airports for:

a) All flight to be operated or being operated under instrument flight rules (IFR), except as indicated in paragraph 6.1.3 above.

b) All the phases of these flights.

6.1.8 ATFM shall be applied to each of the following parties, or to anyone acting on their behalf and that is involved in air traffic flow management activities:

a) Aircraft operators

b) Air traffic service providers

c) Units involved in airspace management

d) Airport operators.

e) The central unit that has been charged by member States with the provision of air traffic flow management services.

6.1.8.1 Roles in ATFM planning

a) Aircraft operators

In the strategic phase, the role of aircraft operators will be based on expected demand, and they will participate in the assessment of ATFM plans in relation to their own activities. In subsequent phases, participation will be at a more individual level, since the aircraft operator must be in a position of making decisions according to the impact that ATFM has on its flights.

Cooperation will be achieved through the precise exchange of information that aircraft operators send to ATFM (for example, flight data) and the information provided by ATFM on the impact and opportunities generated.

For an efficient cooperation, procedures and tools providing seamlessness, efficiency and precision (automation) should be developed.

b) Air traffic service providers

For the strategic phase, planning of resources will be the starting point in the dialogue between ATC and ATFM, in which not only information from airspace managers, but also information about equipment availability and staffing is used. Most of the work can be done locally, managing the available resources for an efficient service provision.

In subsequent phases, the use of recourses will follow the same process and, finally, ATFM measures will be applied to avoid overload or to optimise capacity utilization.

c) Units involved in airspace management

In the strategic phase, dialogue between airspace managers (civil and/or military actors) and the other stakeholders shall be ongoing. The purpose will be to have an airspace system as efficient as possible with respect to traffic forecasts.
This system must be sufficiently flexible to accommodate new activities in order to maintain certain degree of freedom in case of unexpected events. Furthermore, the system will provide solutions to the different scenarios in case of uncertainty. The route network structure, sector design, and airspace definition will be the core elements for capacity management. In turn, ATFM will provide information about efficiency and opportunities for improvement. During subsequent phases, airspace managers will have to participate actively in the decision-making process (CDM). The impact of their activity on flow measures is significant, and the best way of providing the required efficiency would be through the integration of these decisions within the capacity management process. Airspace managers also provide key information for flight planning. In this regard, flight planning activities will be supported by the flexibility provided by airspace management; for example, considering airspace when making changes to flight plan filed in advance.

d) Airport operators

In the strategic phase, airport capacity must be considered in terms of its impact on ATFM. Likewise, airport slot coordination processes will provide valuable information for demand analysis.

In the subsequent ATFM phases, airline schedules will provide updated information about time of departure and arrival of flights. This information will be aligned with the operational data in order to integrate the ATFM process within a timeliness context.

For effective gate-to-gate management, an ongoing exchange of information between airports and between airspace managers and ATFM is required.

e) Centralized ATFM unit

The main function of a centralized ATFM unit will be to act as a catalyst and facilitator in the network management process for all ATFM actors. Planning and coordination shall be extended to the regional level in order to reflect the new role of all stakeholders, through automation and the exchange and processing of common data.

In order to improve ATFM efficiency, the centralized unit will play an airspace management role, ensuring data consistency and collaborating with airports. In particular, it will act as central database with data relevant to the area under its responsibility. It will also coordinate ATFM matters with other States outside of its area of responsibility.

Relationship between ATFM partners

6.8.1.2 The relationship among all the actors involved in ATFM shall be established through formal agreements (memoranda of understanding - MoUs). These formal agreements must emphasize safety and efficiency, through a collaborative decision-making process.

Chapter 7: ATFM Units

7.1 ATFM units are dynamic bodies that evolve according to user needs, maintaining a balance between ATC requirements, on the one hand, and airline requirements, on the other. These bodies rely largely on their CDM network that operates at airports and airlines. This CDM network constitutes an essential link, since it provides ATFM units with information on the demand and other matters, such as the existence of adverse meteorological conditions and operational limitations. ATFM units, on their own, cannot increase capacity, but they can ensure that the existing capacity is maximized. MAKE REFERENCE TO THE SAM ATFM ROADMAP.

7.2 ATFM mission

7.2.1 Provide air traffic flow management services in order to meet the safety requirements of air traffic control services, the efficiency requirements of airspace system users, and environmental requirements, duly taking into account the satisfaction of the aeronautical community and air transport development.

7.2.2 Regulate demand, based on the capacity of the operational scenario, modifying the conditions of the latter so as not to exceed the established capacity values.

7.2.3 ATFM is a service that is provided with the following main objectives in mind:

- Develop and maintain the highest level of quality of the air traffic flow and capacity management service.
- Regulate traffic flows and ensure (ATS) services are not overloaded.
- Give advice and assist in flight planning and minimisation of congestion-related penalties.
- Maintain and improve the profitability of its operations by increasing the level of automation, taking advantage of technological development.
- Provide reports and statistics on operations and delays for operational and managerial purposes.
- Maintain a high level of response to requests for system improvement and evolution from ATS services and users.

7.2.4 Management of an ATFM unit is extremely useful in case of a major difficulty. For example, it may contribute to mitigate the problems resulting from adverse meteorological conditions or disruptions caused by workers' demands. Such disturbances can be minimized thanks to its operational scope, capacity to promptly deviate flights and excellent relations it may establish with the AOs.

7.3 Organization and structure

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

a) The air traffic flow management system

b) Coordination/exchange of information, both internally and externally

c) A line of authority for the implementation of decisions

d) Compliance with mission requirements

7.3.2 Each organization may establish a Line of Authority to support the ATFM mission. This may include the following responsibility positions:

a) Manager of the traffic flow management system

b) The flow management unit that provides surveillance over a specific geographic region and/or facilities

c) The flow management positions responsible for the day-to-day traffic flow management activities

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

7.4 **Flow management unit (FMU) / Flow management position (FMP).**

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

7.4.2 FMU/FMP duties may include:

a) Create and distribute the action plan prior consultation with the designated facilities and customers

b) Collect all relevant information, such as meteorological conditions, delays, interruption of navaids/radar, runway closures, telecommunication failures, deficient operation of computers, and procedural changes affecting air traffic facilities. This may be accomplished through various means available, such as teleconferences, e-mail, internet, etc.

c) Analyze and distribute all data

d) A complete description of all TMIs (for example, ground delay programs, miles in track - MIT) is recorded in a designated log, which must include, among other data, the time of start and end, the affected facilities/operations and the justification.

e) Coordinate procedures with the parties involved.

f) Create an structure for dissemination of information; for example, a website

g) Conduct daily teleconferences, as required

h) Monitor/review the flow management system, make adjustments where necessary, and cancel when no longer required.

7.5 Tactical capacity and demand monitoring

7.5.1 Once the declared and available capacities have been established, air traffic demand can be monitored and assessed, and traffic management initiatives (TMIs) adopted to attain a balance in the system.

7.5.2 The following example gives a general idea of the steps involved in the actions/analyses before and after the event. See Appendix B, Flow diagram for ATFM analysis.

a) Determine capacities: Review/assess airport/ATC sector capacities for accuracy

b) Assess demand: Determine foreseen demand for a specific time frame, 15-minute period(s), hour(s), etc.

c) Analysis and comparison: Compare and analyze demand and capacity levels, as well as the periods in which the demand exceeds the available capacity. It would be easier to do this by means of technological tools for a better ATFM analytical process. Appendix C shows automated tools that facilitated this process, such as SYNCHROMAX, TFMS, PROSAT, used by Brazil, Mexico, Colombia.

d) CDM model (see CDM Manual): Communicate the situation to the facilities/parties involved through the means available, using the CDM methodology.

e) Action required for mitigating a demand imbalance: After collecting and requesting information, determine the traffic management initiatives (TMIs) that are appropriate for the situation.

f) Disseminate information: Inform the parties involved about the TMIs applied using the means available to that end.

g) Monitor the situation: Examine the situation periodically, as necessary, to make sure that the TMI applied is mitigating the imbalance. If necessary, re-assess and make the corresponding adjustments.

h) Conduct an analysis after the event: Following the event, conduct an analysis to determine the effectiveness of the TMI, and catalogue the best work practices. This analysis may be conducted by reviewing the weekly or monthly report of the FMU/FMP. Appendix G describes a monthly report of the FMU of Colombia.

7.6 Training requirements for FMU/FMP personnel

7.6.1 Personnel performing functions at the centralized ATFM unit or at the regional FMU/FMP regional will require standard and recurrent training in order to keep up-to-date in a fluid and constantly changing environment. A detailed ATFM training plan will allow the personnel to attain an optimized operational efficiency in their respective FMU/FMP. This will allow them to successfully face the important changes in their operational environments and provide the highest possible level of service to the customer.

Chapter 8. ATFM phases

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

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

8.2 ATFM strategic phase (Planning)

8.2.1 Measure taken with more than one day in advance of the day in which it will become effective. This planning is normally done two to six months in advance.

8.2.2 The ATFM strategic phase seeks a greater dialog between ATFM partners and capacity "providers" in order to analyze airspace, airport and ATC restrictions, seasonal weather changes and significant meteorological phenomena. It also seeks to identify, as soon as possible, any possible discrepancies between demand and capacity in order to jointly define possible solutions with the least impact on traffic flows. These solutions would not be frozen in time, but would be applicable according to the demand foreseen in this phase.

8.2.3 The main output of this phase is the creation of a list of hypotheses, some of which are disseminated in aeronautical information publications that, through capacity forecasts, allow planners to find solutions for problem areas while improving support to ATFM by anticipating the solution to possible traffic configurations.

8.2.4 The strategic phase may be divided into two parts:

- A continuous data collection and interpretation process, with a systematic (information quality control) and regular review of procedures and measures.

- An international process of coordination with the units or positions (FMU/FMP) of the Region with a view to ensuring the compatibility and efficiency of national and international requirements.

8.2.5 The ATFM strategic phase has the following objectives:

- Identify demand/capacity imbalances in ATC systems, whether in underutilized or saturated areas.

- Use that information to recommend measures leading to the achievement of additional capacity or to an effective use of the existing one.

8.2.6 Regarding the above, a comparison between available traffic forecasts and known capacity data is a method that could be used to detect demand/capacity imbalances.

8.2.7 Gathering of demand and capacity data

a. DEMAND data can be obtained from different sources, such as:

- Demand-adjusted databases.
- Recent traffic history, comparable to the one to be analyzed (the same day of the previous week or of some high-demand period).
- Traffic trends provided by national authorities, user organizations (e.g., IATA), etc.
- Repetitive flight plans (RPL) filed by the AOs.
- Other related information (air shows, major sports events, military manoeuvres) and, in general, events or situations that might entail an additional or extraordinary demand that affects available ATC capacity.

b. CAPACITY data is provided by the different ATCs. Despite that, it is important to have close coordination among ATFM components to make sure that available capacity is distributed in such a way that it meets the existing demand.

8.2.8 Regarding the above, it is necessary to take into account factors such as personnel availability forecasts, possible medium-term changes in ATC procedures; installation of new equipment, airport infrastructure works that affect runways or parking positions, etc.

8.2.9 It is expected that ATFM strategic measures in the airspace will be enough to prevent overload in control centres, especially in those airspaces with a significant over-flight demand.

Note: Collaborative decision-making (CDM) will permit the optimization of assets to maximize performance, thus enabling a foreseeable scheduling.

8.3 ATFM pre-tactical phase (Anticipation)

8.3.1 Measures to be taken from one day to six hours prior to the operation, a definition which differs from the one described in the Procedures for Air Navigation Services - Air Traffic Management document (PANS-ATM), which specifies that the measure has to be taken more than one day prior to the date in which it will become effective. The pre-tactical phase involves the study of the demand for the day of the operation (since 48 hours before), comparing it with the capacity available on that day, adjusting the plan developed in the ATFM strategic phase, or determining different measures as necessary.

8.3.2 The main objective of the pre-tactical activity is to optimize capacity through a more effective organization of resources, based on the foreseen traffic demand (for example, sector configuration management, use of alternate flight procedures, etc.).

8.3.3 The work methodology consists in maintaining an optimum collaborative capacity (CDM) and is based on a close relationship between the ATFM unit, the air traffic management positions (FMPs) at the air traffic control centres or ATC units and the other corresponding partners (airspace managers, airlines).

8.3.4 The final result is a plan that describes the necessary capacity resources and the measures still pending for regulating traffic. This activity uses hypotheses developed in the strategic phase and adjusts them to the expected situation. The time limits of the activity are related to the precision of the forecasts (one week at the most) and to the capacity of the different partners.

8.3.5 The flight intention of air operators should be consistent with the plan developed during the strategic phase and with the adjustments made during the pre-tactical phase.

8.3.6 The success of the activity depends to a large extent on the quality of human relations and mutual trust, as well as on the precision, reliability and timeliness of the information exchanged. All this requires an effective combination of technical and diplomatic abilities to attain optimum results.

8.3.7 Once the process has been completed, the agreed measures, including restrictions, should be disseminated through an ATFM or ANM message, which may be distributed through the AFTN or the various aeronautical communication networks.

8.3.8 The tasks to be performed during this phase may include the following:

- Determine the capacity available in the various areas, based on the particular situation that day.
- Estimate the existing demand.
- Conduct a comparative demand/capacity study.
- Study the sectors that are expected to have saturation, flows affected, calculating the acceptance rates to be applied according to system capacity.
- Prepare a summary of ATFM measures to be proposed and submit them to the ATFM community for CDM.
- Eighteen hours before the operation, a last review should be carried out in consultation with the affected ATC units, in order to determine the definitive ATFM measures, which shall be published through the corresponding ATFM messaging before the operations are affected.

8.3.9 Acceptance rates may be established taking into consideration the following:

- They should be expressed as the number of flights in a period of time over a given point.
- Acceptance rates that are applied for extended periods of time must be periodically calculated.

- It is advisable to conduct a subsequent study to assess the impact of the measures and to adjust them, inasmuch as possible, based on the information received from the various units that make up the system, and to be able to make the necessary tactical adjustments.

Note: See Appendix F, which contains and describes an application format to determine the acceptance rate over a primary radio aid for approach to an airport. With the information contained in the format, it is possible to determine the effectiveness of capacity reductions in face of the events occurred, while describing the air traffic management information coordination exercise specified in Chapter 11.

8.4 ATFM tactical phase (Reaction):

8.4.1 During this phase, measures are adopted six hours in advance of the operation. Tactical management of traffic flows and capacity involves considering, in real time, those events that affect the plan, and making the necessary modifications.

8.4.2 The main objective is to minimize disturbances and take advantage of any opportunities that may arise. The need to adjust the original plan may result from staffing problems, significant meteorological phenomena, crises and special events, unexpected opportunities or limitations related to ground or space infrastructure, more precise flight plan data (FPL), the revision of sector capacity values, etc.

8.4.3 The provision of real information is of vital importance in this phase, since it permits short-term forecasts, including the impact of any event. There are different types of solutions that may be applied, depending on whether the aircraft are already airborne or about to take off. Interaction with traffic synchronization is essential to reach the best compromise.

8.4.4 Proactive planning and management phases use all the information available on forecasts. It is also of vital importance to make improvements to the aforementioned phases based on relevant information.

8.4.5 The tactical activity is aimed at ensuring that the measures taken during the strategic and pre-tactical phases solve the demand/capacity problems in the flows or areas of application, and that the measures taken are the minimum required and unnecessary measures are avoided. It also seeks to ensure that ATC resources are properly used and that the existing capacity is maximized without jeopardizing safety.

8.4.6 It should also be borne in mind that existing delays are equitably distributed among operators. To this end, real-time monitoring of the ATFM Plan is required in close contact with the ATC.

8.4.7 In this tactical phase, the main ATFM measure is the application of ATFM slots, trying to avoid major penalties for the operators.

Chapter 9: Traffic Management Initiatives (TMIs)

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

9.2 Purpose of TMIs

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

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

9.3 Types of TMIs

Name	Description
In-flight holding	In-flight holding of aircraft is a commonly used TMI, especially when its use is foreseen due to traffic volume, weather conditions, power outages, unexpected events, etc. When in-flight holding is expected, AT facilities and customers can make appropriate adjustments and alert personnel as to the reasons and length of holding. Airborne holding is normally done when the operating environment supports holding and the conditions are expected to improve shortly; this ensures aircraft are available to fill the capacity at the airport.
Altitude	Used for segregating different traffic flows, or to distribute the number of aircraft requesting access to a specified geographic region. **a. Capping**: Term to indicate aircraft will be cleared to an altitude lower than their requested altitude until they are clear of a particular airspace. Capping may apply to the initial segment of the flight or for the entire flight. **b. Tunneling**: Term to indicate traffic will be descended prior to the normal descent point at the arrival airport to remain clear of an airspace situation; e.g., holding. Capping and Tunneling are techniques commonly used to keep aircraft from entering busy and complex sectors and still permitting them to depart with minimal delays.

Name	Description
Fix balancing	Assigning an aircraft a fix other than that in the filed flight plan in the arrival or departure phase of flight to equitably distribute demand.
Ground delay programme (GDP)	A GDP is a TM process administered by the FMU, when aircraft are held on the ground in order to manage capacity and demand at a specific location, by assigning arrival slots. The purpose of the programme is to support the TM mission and limit airborne holding. It is a flexible programme and may be implemented in various forms depending upon the needs of the air traffic system.
Ground stops (GS)	GS is a process that requires aircraft that meet specific criteria to remain on the ground. Since this is one of the most restrictive methods of traffic management, alternative initiatives should be explored and implemented if appropriate. GS should be used: **a.** In those cases in which capacity has been severely reduced at airports/runways closed for snow removal, or due to aircraft accidents/incidents; **b**. To preclude extended periods of in-flight holding; **c**. To preclude sector/centre reaching near saturation levels or airport grid lock; **d**. In the event a facility is unable or partially unable to provide ATC services due to unforeseen circumstances; and **e**. When routings are unavailable due to severe weather or catastrophic events.
Miles-in-trail (MIT)	The number of miles required between aircraft that meet a specific criteria. The criteria may be separation, airport, fix, altitude, sector, or route specific. MIT are used to apportion traffic into manageable flows, as well as to provide space to accommodate additional traffic (merging or departing) in the traffic flow.
Minutes-in-trail (MINIT)	The number of minutes required between successive aircraft. It is normally used in a non-radar environment, or when transitioning to a non-radar environment, or when additional spacing is required due to aircraft deviating around weather.

Name	Description
Rerouting	Reroutings are ATC routings other than those shown in the filed flight plan. They are issued to: **a.** Make sure that aircraft operate along the traffic "flow". **b.** Remain clear of special use airspace. **c.** Avoid congested airspace. **d.** Avoid areas known for their difficult weather conditions, and which aircraft are circumventing or refusing to fly.
Sequencing programmes	These programmes are designed to achieve a specified spacing between aircraft. They may be software-generated or determined by ATFM personnel. Different types of programmes accommodate different phases of flight. **a. Departure Sequencing Programme (DSP)** - Assigns a departure time to achieve a constant flow of traffic over a common point. Normally, this involves departures from multiple airports. **b. En route Sequencing Programme (ESP)** - Assigns a departure time that will facilitate integration in the en route stream. This is accomplished by instructing an air traffic control tower to call the traffic management unit for release -- "Call For Release." **c. Arrival Sequencing Programme (ASP)** - Assigns fix crossing times to aircraft destined to the same airport.

9.4 TMI approval authority

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

9.5 TMI processing

9.5.1 Prior to implementation, the FMU/FMP responsible for ATFM oversight must identify the need for a TMI, examine alternative options, and develop a justification for the TMI. The FMU/FMP shall discuss and coordinate the proposed TMI with the receiving facility prior to implementation. FMPs must continuously monitor and assess the TMIs and make the necessary adjustments, including cancellations and notifications, in a timely and effective manner.

Chapter 10: Collaborative Decision-Making Process (CDM)

10.1 CDM is a work methodology that allows the participants in the system to optimize their decisions in collaboration with others, learning about their preferences, limitations, and the actual and foreseen situation. To that end, each participant must be committed with the collaborative effort, sharing responsibility, information, resources, objectives and mutual trust. CDM is, therefore, a key element for maximizing airport and air operations, since it takes into account all the elements involved in the coordination between air navigation service providers, like flow management units (FMUs), and the recipients of such services, like aircraft and airport operators.

10.2 The CDM strategy is to include all the stakeholders in the planning process, sharing information about the position of the aircraft, predictions, weather forecasts, traffic forecasts and, in general, any aspect that will contribute to the efficient operation of a regional airspace system.

Note: See more details in the Manual on the Collaborative Decision-Making Process for the Caribbean/South American Regions.

Chapter 11: Coordination

11.1 Coordination of traffic management information

11.1.1 It is understood that there exists different levels of traffic flow management oversight within the CAR/SAM regions. The concept is for each service provider to assign responsibility for the collection, dissemination, monitoring, and surveillance of TMIs within their respective FIR.

This methodology would ensure that all service providers and customers have at their disposal the applicable information in a timely and efficient manner.

11.1.2 For example: Tactical information, such as that related to capacities, demand, imbalances, airport conditions and anything that would impact their respective system.

11.1.3 A typical prototype could consist of the following:

a. Control towers (TWR) coordinate with Approach Control Facilities (APP).

b. Approach Control Facilities (APP) coordinate with an Air Control Center (ACC).

c. Air Control Centers coordinate with ATFM authority.

d. ATFM authority would be responsible for dissemination within their respective region.

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

Note: For standardization, it is desirable that the States develop and/or modify the letters of agreement (LOA) in order to attain the standardization described in this coordination.

11.2 Exchange of ATFM information

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

11.2.2 It is recommended that the following three methods be applied:

a. Scheduled telephone conference. Consists of defining a time(s) in which the ATC/ATFM units will hold a daily operational conference to exchange ATFM information.

b. Tactical telephone conference. Consists of a non-scheduled ATFM teleconference held in real-time and at a tactical level in order to make the necessary operational adjustments.

c. Automated web page or ATFM operational information system. ATFM service providers may create a web page or an information system, containing relevant ATFM information, as described in this paragraph. The purpose is to share information about the system in order to develop a common situational awareness and minimize workload. It should include:

1. ATFM strategic/pre-tactical initiatives
2. ATFM tactical initiatives
3. Closure of airports
4. Meteorological information
5. Information about air navigation aids
6. Valid NOTAMs affecting capacity
7. Programming of inspection/calibration flights
8. GNSS operational status
9. Information about delays
10. Severe meteorological conditions
11. Information on airports
    a. Operational configurations
    b. AAR for each configuration
12. ATFM strategic plan
13. ATFM operational teleconference
    a. Schedules
    b. Registry
14. Special procedures in force
    a. LVP
    b. De-icing

11.3 ATFM strategic plan

11.3.1 The ATFM strategic plan may take into consideration the terms of balancing demand and capacity, ATFM initiatives, special operation requirements, special events and any other events that may arise. The purpose is to tactically and/or strategically develop an outlook for the applicable airspace system that the aviation community can use as a planning forecast. Specific items that may be included are similar to those in the web page/information system and allow the aviation community to contribute to the development of this plan. For example, an FMU/FMP would canvass applicable Air Traffic facilities and customers on how best to address impacts on the system.

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

11.4 Implementation, adjustment, coordination, and cancellation of TMIs

11.4.1 It is recommended that States and/or service providers develop an internal operations manual for their respective facilities, describing the aforementioned actions. For example:

a. The implementation of the TMIs will be accomplished through established means, such as telephony, web page/information system, or any other available methodology.

b. Constant monitoring would be required for making the corresponding adjustments.

c. TMIs shall be cancelled when no longer needed and demand/capacity balancing is achieved. It is important for all system users to be aware of cancelled initiatives so as to make the corresponding adjustments.

11.5 Civil/military coordination

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

11.5.2 ATFCM principles are equally applicable to both civil and military flight operations and will provide more flexibility to air operations, thanks to the greater availability of both information and airspace. However, there will continue to be operational, training missions, which, by nature, could be incompatible with civil requirements or practices. The degree of civil/military integration in terms of air traffic management within each State continues to be a matter of national competence and, therefore, military participation in a regulated aeronautical information infrastructure will be subject to national security considerations.

11.5.3 The flexible use of airspace concept permits an optimum sharing of airspace under appropriate civil/military coordination to achieve the proper separation between civil and military flights, thus reducing the need for airspace segregation.

11.5.4 Benefits of civil-military coordination

a) Operational savings for flights through distance, time and fuel reductions.

b) Route network optimization for the provision of ATS services and the associated sectoring, providing ATC capacity increases and a reduction of delays of air traffic in general.

c) More efficient air traffic flow separation procedures.

d) Enhanced real-time civil/military coordination

e) Reduced need for airspace segregation.

f) Definition and use of temporary reservation of airspace more in keeping with operational military requirements, in a way that responds to their specific requirements in the best possible way.

Chapter 12: Common terminology related to ATFM unit (FMU/FMP) coordination messages

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

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

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

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

12.5 **ATFM message components**

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

12.5.2 This section breaks down the five message components.

WHO: Identifies the parties involved: who is transmitting and receiving the message.

Examples: CGNA THIS IS COLOMBIA FMU

CCFMEX THIS IS FAA ATCSCC

WHAT: Indicates the measure to be applied.

Examples: REQUEST 30 MILES IN TRAIL

REQUEST 5 MINUTES IN TRAIL

WHERE: This identifies the scope (ATC sector, airport) of application of the coordinated ATFM measure. It is often preceded by a modifying clause, indicating what aircraft or traffic the restriction will apply to. The modifying clause and the location combination are used to construct the "where" component.

Examples: FOR ALL AIRCRAFT LANDING EL DORADO INTERNATIONAL AIRPORT

FOR ALL TRAFFIC LANDING HOUSTON INTERCONTINENTAL AIRPORT

WHEN: Indicates the period of effectiveness of the ATFM measure.

Examples: FROM NOW UNTIL 1700 UTC

FROM 2000 UTC TO 2130 UTC

WHY: Indicates the reason for the ATFM measure:

Examples: DUE TO SEVERE WEATHER OVER EL DORADO INTERNATIONAL AIRPORT

DUE TO RADAR FAILURE AT EL DORADO INTERNATIONAL AIRPORT

The following is an example of a complete message:

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

12.6 Amendments to ATFM messages

12.6.1 The amendment of an ATFM message should include similar elements but with additional modifiers. These modifiers may include (change for another State):

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

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

Cancellation (change for another State)

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

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

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

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

Chapter 13: ATFM control messages (via AFTN, AMHS, others)

13.1 Timely reporting of restrictions imposed on air traffic flow is fundamental for the implementation of management initiatives (TMI). Accordingly, the essence of an ATFM message is to provide information to stakeholders according to foreseen capacity, and to inform about regulations foreseen by management units.

13.2 ATFM units should use specialized messaging for reporting on regulations or the application of ATFM measures to all system users, and when restrictions need to be imposed on traffic flow, for which the following messages may be used:

- Flow delay message;
- Message on flow control restrictions; and
- Message for cancelling flow control measures

13.3 Basic information that ATFM messages should contain:

- Date and time of start and end of the message.
- Date and time of issuance of the AIM message.
- Summarized description of the message.
- The detailed message.
- Areas where the regulation is to be applied, whether a sector, airport (departures or arrivals), and even a specific point in airspace.
- Traffic that will be affected by the regulation (incoming, outgoing, en-route).
- Hour reference to be used for identifying the aircraft that will be affected, whether ETD/EOBT, ETA or ETO.
- Period of effectiveness of the regulation.
- Procedure for assigning the time of departure.

13.4 Since ICAO has not yet officially developed the format and conventional display of data for the automatic exchange of flow control messages, their design and implementation shall be proposed and discussed at the regional meetings.

ATTACHMENT A

EXPLANATION OF TERMS

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

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

Among them are:

Aerodrome Community - The air traffic control authorities, aerodrome authorities, commercial, military, and general aviation operators, and other parties involved in the provision and operation of the physical infrastructure needed to support the take-off, landing, and ground handling of aircraft.

Airspace Providers - Refers, in general terms, to Contracting States/Territories in their capacity as airspace owners with the legal authority to permit or deny access to their sovereign airspace. The term may also be applied to organizations of the State assigned responsibility for establishing the standards and guidelines for use of the airspace.

Airspace users - Refers to the commercial, military, and general aviation operators that utilize the sovereign airspace of States/Territories/Organizations.

ATM service providers - All of the organizations and personnel (e.g., controllers, engineers, technicians) involved in the provision of ATFM services to airspace users.

Military aviation - Refers to the personnel, aircraft, and equipment of military organizations that serve a vital role in the security of States/Territories.

International Civil Aviation Organization (ICAO) - Considered the only international organization in position to efficiently coordinate the implementation activities of global ATM.

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

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

Air Traffic Flow and Capacity Management (ATFCM) – A service that optimizes the relationship between system capabilities and air traffic demand, making maximum use of available capacity to ensure an optimum air traffic flow.

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

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

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

Capacity (for ATFM purposes) -

Capacity means the operationally acceptable air traffic volume. Capacity is expressed in terms of the number of aircraft entering a specific part of the airspace (sector), overfly a point, take off from or land at an aerodrome (or group of aerodromes) in a given period of time.

Thus, ATM capacity is the one capable of providing air navigation services to a given air traffic volume, meeting maximum safety objectives without significantly impairing operating capacity, economics or the environment under normal conditions.

An example of operating capacity impairment is ground delays, the assignment of a cruise level other than the optimal during a considerable period of flight time. Consequently, the determination of capacity is fundamental for optimizing the air navigation system and achieving the highest efficiency, that is, the maximum capacity at the lowest cost.

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

Available capacity - The maximum traffic flow attainable during a specific time unit, based on the real conditions of the ATS system at each moment, and that must be kept for a period of time, in keeping with safety requirements and the acceptable mean delay factor.

Under optimum conditions, the available capacity is equivalent to the declared capacity.

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

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

Delay - Time elapsed from the moment the operation is scheduled until the moment it is performed, expressed in minutes, and indicates the capacity of the system to absorb a given traffic demand, under the rules established for the scenario under study. In order to analyse delay, the scheduling of a standard day characterized for having the largest number of movements, shall be used.

There are delays that are considered as additional holding time because the aircraft remains at the aircraft stand, at the runway-holding position, on the runway, on a taxiway and/or in any holding pattern established along the route. These delays are associated to ATC management.

Delays attributable to the ATC will only be those involving IFR flights and that exceed the number of minutes established by the corresponding authority.

For purposes of reporting and calculating delays, those resulting from the following causes will not be taken into account:

- Speed reductions (delays assumed en route)
- Deviations initiated by the crew due to meteorological conditions
- Technical problems or other operator issues
- Congestion on the apron.

The calculation of these delays starts when the aircraft enters the jurisdiction of the ATC, like, for instance, the manoeuvring area, or enters a holding pattern in flight.

Delays are normally attributed to:

- Meteorological conditions
- Air traffic volume
- CNS
- Runway and taxiway conditions
- And others, such as: safety, accidents, noise abatement, verification flights.

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

Aerodrome Traffic Density - For purposes of analyzing capacity and demand, aerodrome traffic density may be classified as follows:

Low
When the number of movements during the mean peak hour does not exceed 15 movements per runway, or typically less than 20 movements at the aerodrome.

Medium
When the number of movements during the mean peak hour is in the order of 16 to 25 movements per runway, or typically between 20 to 35 movements at the aerodrome.

High
When the number of movements during the mean peak hour is in the order of 26 movements or more per runway, or typically more than 35 movements at the aerodrome.

Note: The number of movements during the mean peak hour is the yearly arithmetic mean of the number of movements during the daily peak hour. Both take-offs and landings are considered as movements.

Efficiency - The relationship between the cost of the ideal flight and the cost of the flight with procedural restrictions.

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

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

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

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

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

ATTACHMENT B

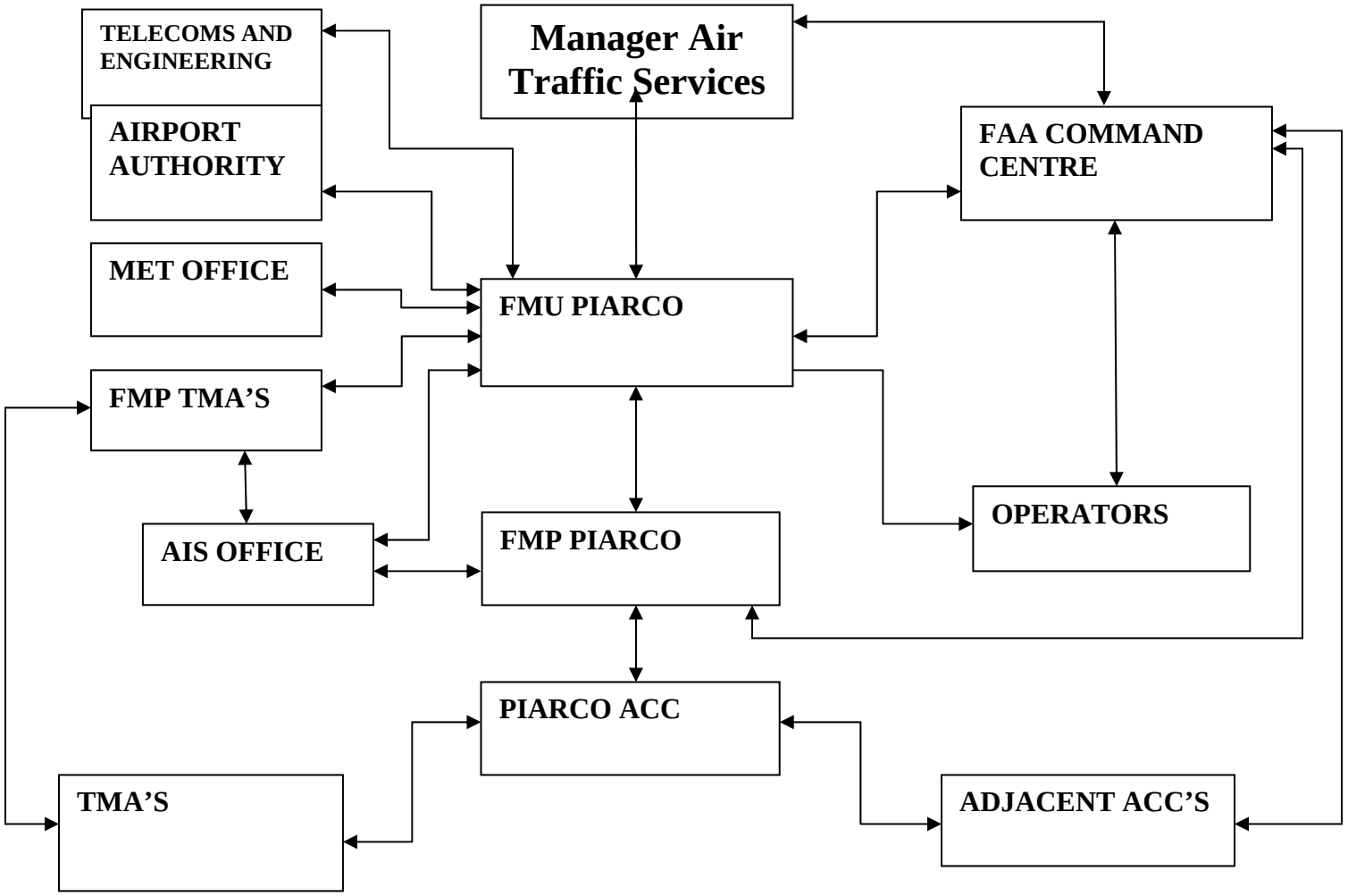
LIST OF ACRONYMS

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

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

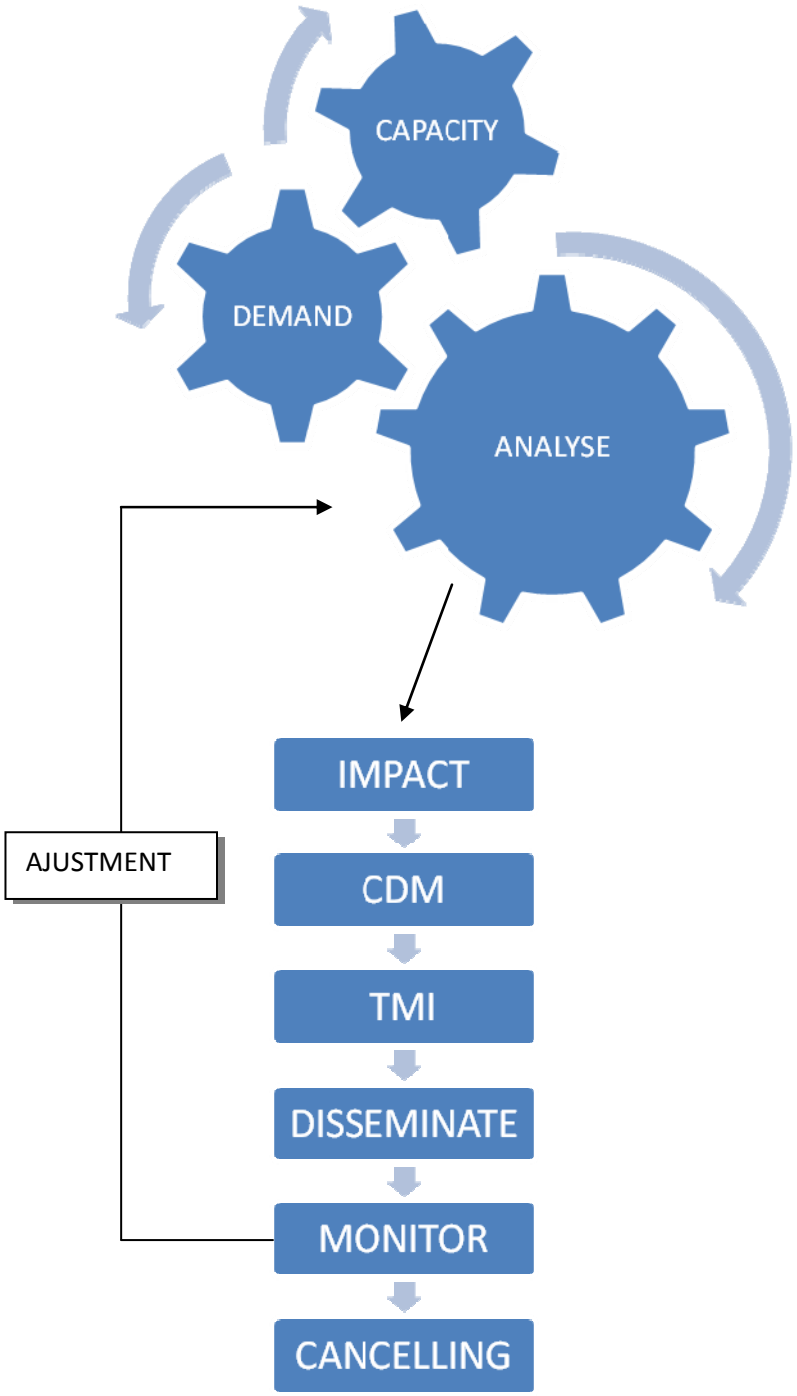
APPENDIX A

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



APPENDIX B

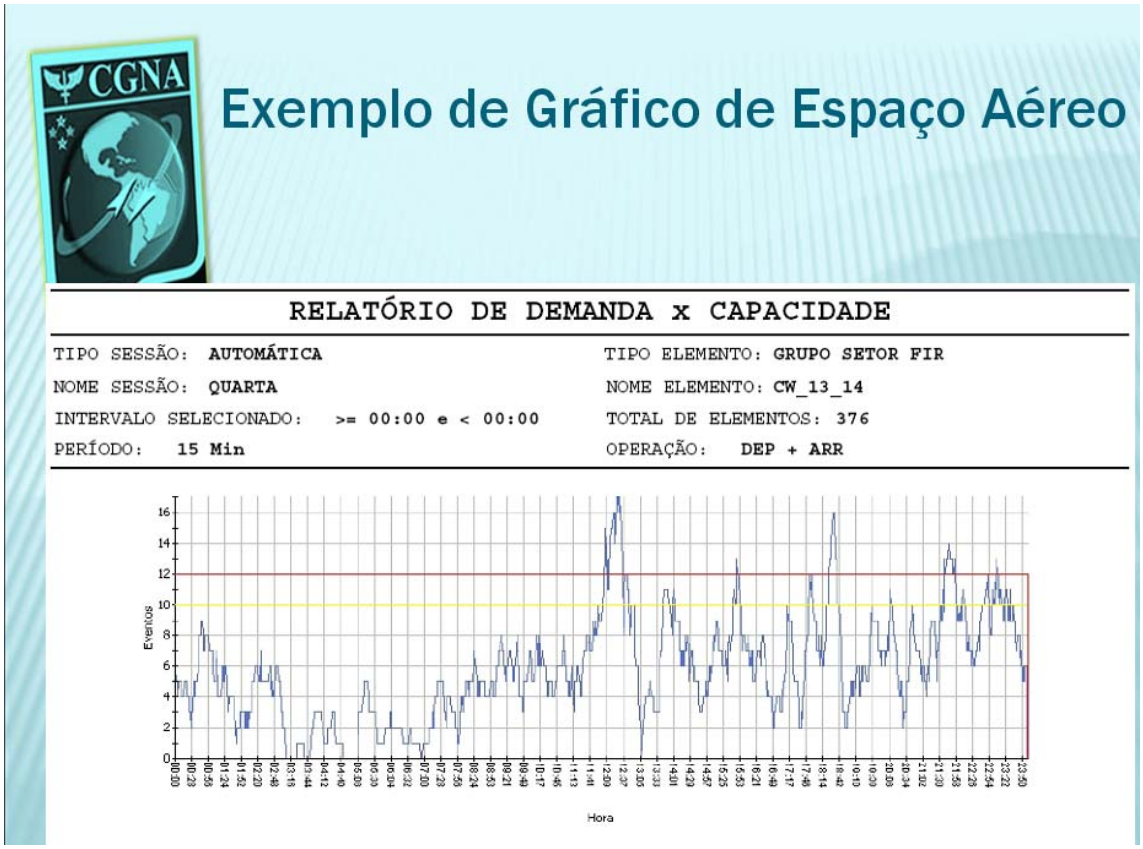
FLOW CHART ATFM ANALYSES



APPENDIX C

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

Synchromax
Brazil

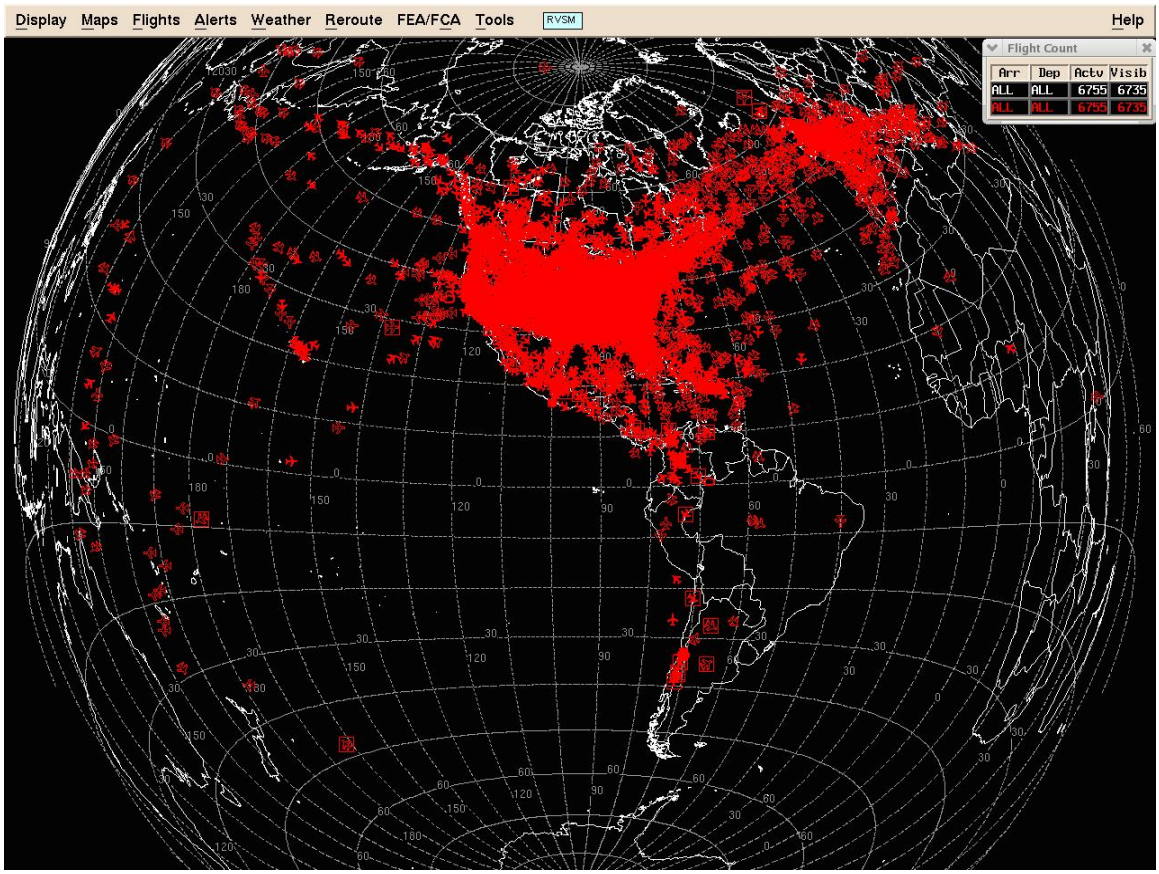


PROSAT

Mexico

Traffic Flow Management System (TFMS)

United States
Mexico
COCESNA
Colombia
Chile



APPENDIX D

INTERNATIONAL OPERATIONS PLANNING TELCON FORMAT

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

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

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

Significant weather and atmospheric conditions
Thunderstorm activity
Turbulence
Volcanic ash clouds

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

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

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

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

_____ Stakeholder input, comments, and questions

_____ Next International Planning Telcon: xxxxZ

APPENDIX E

DEMAND ASSESSMENT FORM

PERIODO	DIA	FECHA	TIPO DE OPERACION	AO	ACID	a/c	ADEP	ADES	EOBT	EXOT	ETOT	EET	ELDT	ADEP	ADES	EXIT	ETTT	ACID2	EOBT	EXOT	ETOT	EET	ELDT

PERIODO	DIA	FECHA	TIPO DE OPERACION	AO	ACID	a/c	ADEP	ADES	EOBT	EXOT	ETOT	EET	ELDT	ADEP	ADES	EXIT	ETTT	ACID2	EOBT	EXOT	ETOT	EET	ELDT
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7400	E-190	SKBO	SKRG	11:00	00:22	11:22	00:32	11:54	SKRG	SKBO	00:03	00:30	7507	12:28	00:13	12:41	00:32	13:14
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	7521	E-190	SKBG	SKBO	11:00	00:15	11:15	00:38	11:54										
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	7501	B737	SKRG	SKBO	11:00	00:15	11:15	00:33	11:49										
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7542	E-190	SKCL	SKBO	11:00	00:14	11:14	00:33	11:47	SKSP	SKBO	00:04	08:07	7543	19:59	00:12	20:11	01:42	21:53
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	660	E-190	SEQU	SKBO	11:00	00:15	11:15	01:09	12:25										
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	670	E-190	SEGU	SKBO	11:02	00:14	11:16	01:34	12:51										
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7430	E-190	SKBO	SKCC	11:03	00:24	11:27	00:48	12:15	SKCC	SKBO	00:02	00:25	7431	12:43	00:13	12:56	00:47	13:43
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	7531	E-190	SKBQ	SKBO	11:15	00:13	11:28	01:08	12:36										
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	7451	E-190	SKBO	SKCL	11:24	00:27	11:51	00:37	12:28										
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7580	E-190	SKBO	SKCG	11:30	00:20	11:50	01:07	12:57	SKCG	SKBO	00:02	00:37	7581	13:37	00:12	13:49	01:06	14:55
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	650	E-190	SKBO	MPTO	11:30	00:21	11:51	01:02	12:53										
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7502	E-190	SKBO	SKRG	12:27	00:22	12:49	00:27	13:17	SKRG	SKBO	00:04	00:49	7511	14:11	00:18	14:29	00:23	14:53
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7552	E-190	SKBO	SKMR	12:28	00:24	12:52	00:51	13:43	SKMR	SKBO	00:03	00:25	7553	14:12	00:12	14:24	00:51	15:16
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7490	E-190	SKBO	SKSM	13:28	00:21	13:49	01:07	14:56	SKSM	SKBO	00:03	00:25	7491	15:25	00:13	15:38	01:09	16:48
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	7461	E-190	SKBO	SKCL	13:58	00:25	14:23	00:38	15:01										
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	620	E-190	SKBO	MPTO	14:00	00:22	14:22	01:09	15:32										
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	7470	E-190	SKBO	SKCG	14:15	00:20	14:35	01:03	15:39										
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7540	E-190	SKBO	SKSP	14:27	00:21	14:48	01:44	16:33	SKSP	SKBO	00:01	00:30	7541	17:05	00:14	17:19	01:41	19:00
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	680	B737	SKBO	MMMX	14:28	00:25	14:53	04:05	18:58	MMMX	SKBO	00:10	01:24	681	20:32	00:23	20:55	03:53	00:49
07/10/10 a 19/010/10	4	7/10/10	One Trip	SAM	627	E-190	MPTO	SKBO	14:43	00:15	14:58	01:06	16:05										
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7524	E-190	SKBO	SKBG	15:37	00:19	15:56	00:39	16:35	SKBG	SKBO	00:02	00:25	7525	17:03	00:12	17:15	00:43	17:58
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7546	E-190	SKBO	SKSP	15:40	00:14	15:54	01:48	17:42	SKSP	SKBO	00:02	00:30	7547	18:15	00:10	18:25	01:45	20:11
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7481	E-190	SKBO	SKLT	17:18	00:21	17:39	01:35	19:14	SKLT	SKBO	00:03	00:35	7480	19:53	00:09	20:02	01:46	21:48
07/10/10 a 19/010/10	4	7/10/10	Round Trip	SAM	7542	E-190	SKBO	SKSP	17:19	00:23	17:42	01:43	19:25	SKSP	SKBO	00:03	00:30	7543	19:59	00:12	20:11	01:42	21:53

PERIOD: Period of effectiveness (start and end dates).
DAY: 1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, 6=Saturday, 7=Sunday.
DATE: The DAY must correspond to the calendar date
TYPE OF OPERATION:
***Round Trip** - If the aircraft goes and returns immediately to the airport of origin.
***One Trip** - If the aircraft returns after covering other routes.
AO: Airline - ICAO designator.
ACID: Aircraft identification - Flight number.
a/c: Type of aircraft - ICAO designator
ADEP: Airport of departure - ICAO designator
ADES: Airport of destination - ICAO designator
EOBT: Estimated time (UTC) at which the aircraft begins the movement for departure.
EXOT: Departure taxiing estimate - Estimated time of operation between the EOBT and the (ETOT).
ETOT: Estimated time of take-off - (EOBT+EXOT).
EET: Estimated time of flight.
ELDT: Estimated time of landing - (ETOT+EET).
EXIT: Arrival taxiing estimate - Estimated time between landing and the arrival at the parking position.
ETTT: Time estimated by the AO for traffic at the departure airport.

APPENDIX F

APPLICATION FORMAT FOR DETERMINING THE ACCEPTANCE RATE

	UNIDAD DE GESTION DE TANSITO											Fecha:	23/08/10	
												Clave:		
												Versión:	01	
	TITULO: GESTIÓN TÁCTICA DE CAPACIDAD - SECTORES TERMINALES LLEGADA/SALIDA											Pagina:	1 de 1	
PARA DILIGENCIAR POR EL MANAGER DE LA UNIDAD DE GESTION														
1.	Fecha de solicitud:		Hora de solicitud:											
2.	RÉGIMEN DE ACEPTACIÓN (LLEGADAS/ HORA):		SEPARACIÓN (NM)	5	6	7	8	9	10	11	E	LVP	GROUNDSTOP	
			REGIMEN DE ACEPTACIÓN	36	30	26	23	20	18	16	15	12		
	Vo. Bo. Jefe Grupo ATFM.		MARQUE CON UNA (X)											
3.	RÉGIMEN DE SALIDAS ADR (SALIDAS/HORA):		SEPARACIÓN (MINUTOS)	2,5	3		4		E	LVP				
			REGIMEN DE SALIDAS	24	40	20	30	15	14	10				
	Vo. Bo. Jefe Grupo Torre de Control.		MARQUE CON UNA (X)											
4.	Periodo de aplicación (periodo de 1 hora):													
5.	Motivo:													
6.	Solicitante:													
7.	Configuración Operativa:													
8.	Iniciales (call sign) Manager (TFM) de turno FMU:													
9.	Iniciales (call sign) Supervisor de turnoTorre:													
10.	Iniciales (call sign) Supervisor de turno ACC:													
11.	Información adicional:													
SUPERVISOR ACC, Envíe el formato diligenciado al MANAGER FMU dando CLICK en el siguiente enlace														
PARA DILIGENCIAR POR EL MANAGER (TFM) FMU														
12.	AAR actual:													
13.	ADR actual:													
14.	ARR DEM prevista para el periodo de aplicación:													
15.	DEP DEM prevista para el periodo de aplicación:													
16.	DEMORA PREVISTA:													
17.	ACCIÓN TOMADA:													
18.	Vo. Bo. Jefe Aeronavegación Regional.													
MANAGER FMU, Envíe el formato diligenciado a los correos correspondientes dando CLICK en el siguiente enlace														

	INSTRUCTIVO DE DILIGENCIAMIENTO
	ESTE FORMATO DEBERÁ SER DILIGENCIADO POR EL SUPERVISOR (TWR o ACC) DE ACUERDO A LA LIMITACIÓN OPERACIONAL DETERMINADA.
1.	Fecha y hora UTC.
2.	El señor Supervisor ACC indicará en la respectiva casilla, de la tabla indicada, la separación a aplicar y el correspondiente Régimen de Aceptación. La determinación del Régimen de Aceptación considera una velocidad promedio (ponderada por la mezcla de flota), de 180 KIAS en el VOR/NDB, dividida entre una separación en secuencia determinada (promedio), teniendo como referencia el VOR/NDB (Ej.180KIAS/5NM=36). Para la aplicación de la separación mínima (5 NM) se considera un secuenciamiento alternado a las pistas 13. Para la determinación del Régimen de Aceptación, en configuración pistas 31, se define como punto de referencia el MAPt y se considera una separación mínima de 6 NM (carta de acuerdo). El régimen de Aceptación para control convencional (no Radar) será de 20 llegadas/hora.El supervisor ACC diligenciará nuevamente el formato en cuestión para restablecer la capacidad o cualquier cambio a la misma. En caso falla general de comunicaciones el Supervisor ACC deberá de inmendiato solicitar GROUND STOP a la FMU y se mantendrá coordinación permanente para la reanudación de las operacioanes.**El supervisor ACC deberá registrar el visto bueno del Jefe ACC o en su orden del Jefe Regional de Aeronavegación o del Jefe Nacional de Aeronavegación y en caso de no lograr contactar a estos, la decisión será potestativa del supervisor ACC. Nota: Para los cálculos prescritos se han tenido en cuenta los criterios de velocidad para los tramos de aproximación del Documento 8168 Vol. II de la OACI (Tabla I. 4.1.2.Velocidades (IAS) para el cálculo de procedimientos en Nudos).**
3.	El Supervisor Torre indicará en la respectiva casilla, de la tabla indicada, la separación en tiempo a aplicar y el correspondiente Régimen de Salidas. la determinación del Régimen de salidas considera unos tiempos promedio (minutos) entre despegues de acuerdo a la tabla de separación correspondiente, conforme a las condiciones de operación. **El Supervisor Torre enviará formato diligenciado al correo del supervisor ACC de turno, quien diligenciará lo correspondiente para ser enviado al Manager de la FMU. El supervisor Torre deberá registrar el visto bueno del jefe TWR o en su orden del Jefe Regional de Aeronavegación o del Jefe Nacional de Aeronavegación y en caso de no lograr contactar a estos, la decisión será potestativa del supervisor ACC.**
4.	Se indica de que hora a que hora aplica la reducción de capacidad teniendo en cuenta el tiempo de reacción de la FMU (informado por el Manager) para hacer efectiva cualquier regulación coherente con dicha reducción.
5.	Motivo o limitación operacional por lo cual se solicita la reducción de capacidad a gestionar por la FMU.
6.	ATCO y dependencia ATC que solicita la reducción.
7.	Configuración de pistas en uso.
8.	
9.	EXPLICACIÓN PROPIA
10.	
11.	Se registra toda la información relevante que motive la reducción, coordinaciones adicionales, situaciones especiales etc.
12.	
13.	Capacidad gestionada hasta el momento de la solicitud de reducción (en la hora anterior).
14.	
15.	Demanda de tránsito prevista para el periodo de aplicación de la reducción solicitada.
16.	Demora prevista resultante de la tabla de cálculo de demoras del Manager (TFM)
17.	El Manager de la FMU registrará las medidas de regulación ATFM aplicadas de acuerdo a la capacidad de reacción y a la reducción solicitada.
18.	El Manager de la FMU solicitará visto bueno del jefe de Aeronavegación Regional o en su orden del Jefe Nacional de Aeronavegación y en caso de no lograr contactar a estos, dejará registro y procederá de acuerdo a la solicitud.
19.	El Manager FMU tiene potestad de efectuar las reducciones y regulaciones correspondientes de acuerdo a las predicciones o pronósticos correspondientes como limitaciciones de infraestructura, CNS o Meteorológicas; para lo cual diligenciará igualmente el formato en cuestión y realizará las coordinaciones del caso.
20.	Este procedimiento permitirá luego de seguimiento y análisis desarrollar una matriz de reducción de capacidad teniendo en cuenta las diferentes variables y limitaciones operacionales que se presenten para determinar los regímenes de aceptación regularmente requeridos y coherentes con los requisitos de seguridad y eficiencia operacionales.
21.	Para eventos de discrepancia e incidentes ATFM se deberá diligenciar el formulario correspondiente.

APPENDIX B

MANUAL ON THE COLLABORATIVE DECISION-MAKING PROCESS FOR THE SOUTH AMERICAN (SAM) REGION

(SAM CDM MANUAL)

Version 1.0	
Date	**October 2010**

FOREWORD

The *CDM Manual for the South American (SAM) Region* is published by the SAM Implementation Group (SAMIG), and describes the collaborative decision-making management methods and procedures to be applied in the SAM Region.

The SAMIG will publish revised editions of the Document as necessary to reflect any future implementation activities. Copies of the *SAM CDM Manual* can be obtained from:

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The present edition (Draft Version 1.0) includes all revisions and modifications made until October 2010. Subsequent amendments and corrigenda will be listed in the Record of Amendments and Corrigenda Table, according to the procedure established in page X.

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Chapter 1: Background

1.1 ICAO CNS/ATM Systems were endorsed by the Tenth Air Navigation Conference held in 1992 at ICAO Headquarters in Montreal, Canada. That same year, the CAR/SAM Regional Planning and Implementation Group (GREPECAS) started to work towards the regional implementation of this new air navigation service concept.

1.2 Subsequently, at the Eleventh Air Navigation Conference (AN-Conf/11, Montreal, September 2003), the States endorsed and approved the new ICAO Global ATM Operational Concept, which promotes the implementation of a service management system that permits a seamless regional airspace through the application of a series of ATM functions.

1.3 According to the guidelines established by the ICAO Council regarding facilitation of inter-regional harmonisation, regional CNS/ATM implementation plans should be prepared in keeping with the general profiles defined in the Global Air Navigation Plan for CNS/ATM Systems. Following a careful analysis of the guidelines of this Global Plan, GREPECAS adopted them and incorporated characteristics inherent to the CAR/SAM Regions based on the definition of Homogeneous Areas and Main Traffic Flows. Homogeneous Areas are those airspace portions with similar ATM requirements and levels of complexity, while main traffic flows are airspaces with a significant amount of air traffic.

1.4 From the analysis conducted by ICAO/UNDP Project RLA/98/003, it may be inferred that, although in general there is no traffic congestion currently in the CAR/SAM Regions that requires a complex flow management, some congestion has been identified at some airports and airspace sectors, mainly during special periods and specific hours, which should be avoided.

1.5 Consequently, GREPECAS felt that early ATFM implementation would ensure an optimum air traffic flow towards or through certain areas during periods in which demand exceeds or is expected to exceed the available capacity of the ATC system. Therefore, an ATFM system should reduce aircraft delays, both in flight and on the ground, and avoid system overloading. The ATFM system shall help the ATC to attain its objectives and make a more effective use of airspace and available airport capacity. ATFM should also ensure that the safety of air operations is not jeopardised in case of unacceptable levels of air traffic congestion, while ensuring effective air traffic management with no unnecessary flow restrictions.

1.6 The ATFM/5 meeting examined the draft ATFM manual to be used in the FMUs/FMPs of the SAM Region, containing guidelines on matters related to ATFM implementation, such as demand and capacity, traffic management tools, traffic management initiatives (TMIs), communications and coordination, organisation and structure, system performance measurement, collaborative decision-making, common ATFM terminology. The purpose of the manual was to provide guidance on ATFM.

1.7 The document was in its initial stage, and the meeting deemed it advisable to continue its development. Subsequently, some States that participated at the ATFM/TF/5 meeting reviewed the document and suggested some corrections. Finally, the ATFM Manual was submitted to the First Meeting of the GREPECAS CNS/ATM Subgroup (CNS/ATM/SG/1, Lima, March 2010) and approved for use by CAR/SAM States, Territories and International Organisations.

1.8 The SAM/IG/4 meeting, held under the auspices of Project RLA 06/901, examined different matters related to ATFM, including the lack of a common methodology to calculate airport and ATC sector capacity. The meeting also reviewed the information provided by the States with respect to flow management data processing and display, surveillance and automation systems in support of ATFM, the means available to capture meteorological information, communication systems, and collaborative

decision-making processes (CDM), State coordination between units, the ATFM Manual, amongst other things. It also analysed the tasks that should be performed by the Regional Project, as well as the ATFM action plan.

1.9 The SAM/IG/4 meeting examined pending tasks and ATFM matters analysed by the ATFM work group. As a result, the ATFM Action Plan was updated.

1.10 The Meeting, upon reviewing the progress made in the activities of Regional Project RLA/06/901, analysed, amongst other things, the development of a CDM implementation manual for the SAM Region, initially under an ATFM approach, to serve as a guide for SAM States that have not yet implemented this mechanism.

Chapter 2: Purpose of the Document

2.1 The purpose of this document will be to assist SAM States in the establishment of a common understanding of the Collaborative Decision-Making process (CDM), with a view to the application of this work methodology, which seeks the participation of all the parties involved in ATFM, with measures implemented equitably among ATM system users.

2.2 This document is intended as an introduction and not as a comprehensive body of knowledge. It is understood that this will be considered as a living document that will be modified as required to reflect growth, future requirements and harmonisation in the SAM Region.

Chapter 3: Collaborative Decision-Making Process (CDM)

3.1 CDM has evolved towards a collaborative philosophy or approach to operations. It brings together operators, government, air navigation service providers, the private industry, the military and academia with a view to improving decision-making related to ATM through a better exchange of information, data sharing and better automated tools in support of decision-making.

3.2 As the aeronautical community evolves, the States and/or service providers will have to keep pace with increased demand, the requirement for greater capacity, and technological development. To face these challenges, a new sense of work in partnership will be required from all stakeholders that, directly or indirectly, contribute to the well-being and general success of the aeronautical industry.

3.3 This new work in partnership will combine the talents of all individuals, thus facilitating the harmonisation and globalisation of the global airspace system.

3.4 In an ATFM environment, collaborative decision-making (CDM) is a methodology that brings together service providers and the parties involved in the system in order to obtain better decisions concerning air traffic flow management.

3.5 Thus, CDM is a key element in ATFM for maximising airport and air operations, since it takes into account all the coordination elements between air navigation service providers (like flow management units - FMUs) and the recipients of such services (like aircraft and airport operators). CDM embodies all the participants in the planning process, *sharing information* about aircraft position, predictions, meteorological forecasts, traffic forecasts and, in general, anything that will contribute to the efficient operation of a regional airspace system.

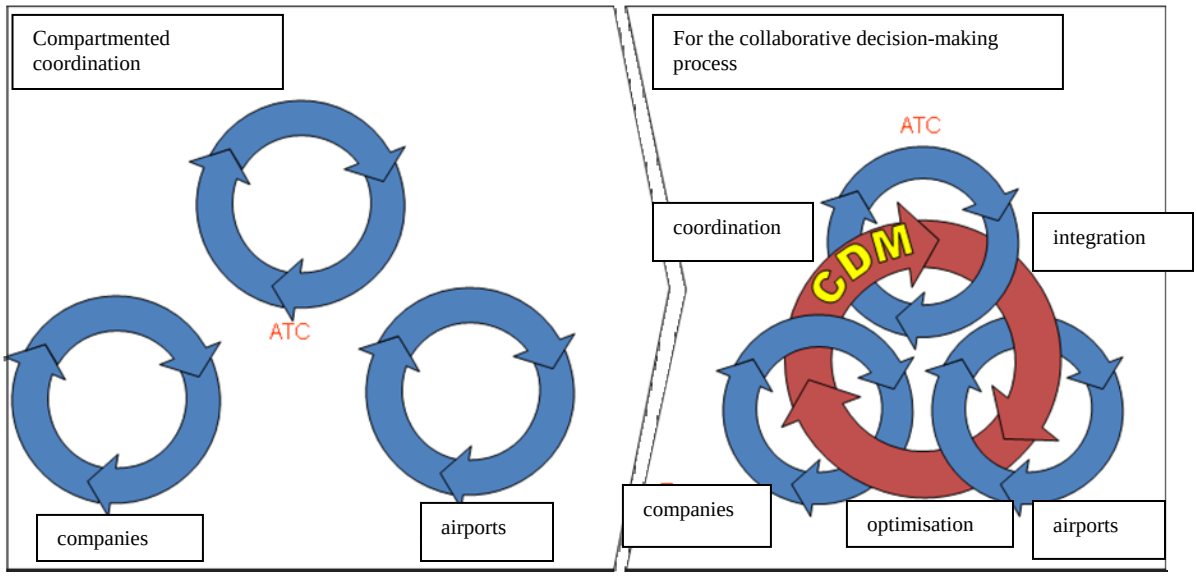


Figure 1: Illustrates a shared coordination scenario for the collaborative decision-making process (CDM).

3.6 The CDM concept is based on the exchange of a large amount of information among the participants, a fact that may sometimes generate concern. The problem does not lie on obtaining or distributing the information. The challenge is to develop a culture of mutual trust and cooperation.

Chapter 4: Exchange of Information based on CDM

4.1 In order to understand the usefulness of the exchange and fluidity of information, some questions may be asked, such as:

a. Have you ever arrived at an airport and had to wait in the taxiway because a parking position was occupied?

b. Have you ever arrived at a parking position that had no ground-based personnel or equipment to take care of your aircraft?

c. Have you ever boarded a flight and had to look for your own seat for a long time before the aircraft left the parking position?

d. Have you known of flights that wait until the last minute to inform that they are not ready and that they will miss their estimated take-off time?

e. Do you know of any airport where immigration, customs and security processes are expensive?

These are the visible symptoms of airport problems that should be addressed. There can be many causes, such as:

a. Insufficient or unreliable information.

b. One system participant does not have the whole picture of the situation.

c. Precise information is provided too late for a participant to be ready on time.

Chapter 5: Objectives of CDM in ATFM

5.1 CDM is a work methodology that forms groups at different levels, specifically focusing on the solution to common problems in a transparent and equitable manner for all participants. However, pursuant to the purpose of this document, we will only discuss CDM within the context of finding the best solution to ATFM-related problems.

5.2 The CDM concept in ATFM seeks to improve air traffic flow and airport capacity management, reducing delays and anticipating events through a better management of resources.

5.3 These objectives include:

a. Providing updated information in real time to all stakeholders, thus ensuring a more accurate prediction of events and a better utilisation of capacity, with the support of a collaborative decision-making process.

b. Service demand/capacity balancing, while meeting the agreed levels of safety and efficiency.

c. Enabling system participants to optimise their decisions in collaboration with others, learning about their preferences, limitations and the actual and foreseen situation.

d. Enabling all members of the ATM community, especially airspace users, to participate in the adoption of decisions affecting them; the level of participation is in keeping with the extent to which the decision affects them.

e. Achieving a solution acceptable to the needs of stakeholders, based on a spirit of cooperation.

f. Foreseeing conflicting situations.

g. Defining a solution.

h. Transferring information among the parties involved.

i. Requiring all parties involved in the system to operate in an equitable manner to improve the system.

Chapter 6: The ATFM Community and its Objectives

6.1 ATFM stakeholders include the organisations, bodies or entities that could participate, collaborate and cooperate in the planning, development, use, regulation, operation and maintenance of the ATFM system. These include:

6.1.1 The aerodrome community - The aerodrome community includes aerodromes, aerodrome operators and other parties that participate in the provision and operation of the physical infrastructure required to support take-offs, landings, and handling of aircraft. Its objective in ATFM is to maximise performance and efficacy, as long as they follow their operational plan. The greatest impact of delays on airport operators is a bad image/name and an inefficient use of airport resources and infrastructure (parking positions, etc.). Furthermore, timeliness of arrivals and departures is the basis for operational efficiency, which should lead to a possible reduction of delays, foreseeing for example new investments in infrastructure.

6.1.2 Airspace providers - In general terms, it refers to Contracting States/Territories, in their capacity as airspace owners, with legal powers to grant or deny access to their sovereign airspace. The term may also be applied to State organisations responsible for establishing the standards and guidelines for the use of airspace. Their objective is to ensure air safety provided the best use is made of available CNS and airport infrastructure.

6.1.3 Airspace users - It refers to commercial, military and general aviation operators that use the sovereign airspace of the States/Territories/Organisations. Their objective is to comply with their planned schedule. The greatest impact that delays have on airspace users is the additional cost (additional fuel, lost connections and side effects).

6.1.4 ATM service providers - All of the organisations and personnel (for example, controllers, engineers, technicians) involved in the provision of ATM services to airspace users. Their objective is to provide air navigation services in a safe, economic and efficient manner during all flight phases, protect air traffic services from overloads, and at the same time, allow aircraft operators to carry out their flight operations as planned, with minimum penalties. This is achieved by making the best use of ATC and airport capacities.

6.1.5 Military aviation - It refers to the personnel, aircraft and equipment of military organisations that play a vital role in airport security of States/Territories. Its objective is to achieve a proper definition of reserved airspace, and collaboration in the area of special operations that meet military operational requirements and its specific requirements.

Chapter 7: Benefits for the ATFM Community

7.1 Aerodrome community

a. Reduction of the environmental impact – noise and emissions.
b. Improved punctuality.
c. Improved management and planning of parking positions.
d. Increased possibility of serving additional flights and passengers.

7.2 Airspace providers

a. Better traffic forecasts – thus reducing workload.
b. Reduced likelihood of errors.
c. Better departure sequencing.
d. Better service quality.
e. Beneficial airport networking effects.

7.3 Airspace users

a. Shorter taxiing times, shorter holding time at the runway-holding positions, no more holding to access occupied parking positions.
b. Fuel savings.
c. Reduced delays, savings in operational costs and customer satisfaction.

d. Increased capacity with the same aircraft fleet.

7.4 ATM service providers

a. More en-route and airport capacity available.

b. Improved compliance with ATFM SLOTs.

c. Less SLOTs wasted.

7.5 Military aviation

Air defence and military control systems will require timely and precise information about flights and intentions of the ATM system. It will participate in airspace reservation and the reporting of aviation activities as well as in the implementation of security-related measures.

7.6 Safety

In order to make sure that safety is not compromised whenever traffic demand in a given airspace or aerodrome is expected to exceed the available ATC capacity, measures will be applied to regulate traffic volumes accordingly.

Note: The community in general will benefit from a mutual understanding based on trust.

Chapter 8: Performance Indicators for Compliance with CDM Objectives

8.1 In order to establish CDM continuous improvement processes to improve the operational efficiency of the system, performance indicators may be established according to the general strategic objectives of the system and the specific objectives of each participant.

8.2 Specific improvement objectives and their performance indicators for CDM implementation are established in order to verify the improvements achieved following implementation.

8.3 Performance indicators are selected based on the availability of historical data and the objectives defined in conjunction with CDM participants.

8.4 The improvements achieved must be measured by comparing the status of indicators “before” and “after” operations. These measurements must be continuously monitored in order to improve the quality of the service.

8.5 Furthermore, the measured improvements will feed the cost-benefit analyses that each participant must perform.

Note: **Appendix A** to this document shows some examples of performance indicators. As the CDM community gains more experience, it will be able to determine and define performance indicators according to its expectations, priorities and requirements.

Chapter 9: Information Management

9.1 The integrated information management vision should guide application developers to consider *CDM as an essential requirement for the generation and distribution of information.* This requirement involves:

a. *Precision and accuracy*: Information must be sufficiently precise and/or accurate, and the user must be informed about safety levels or information validity periods.

b. *Stability:* Information must be sufficiently stable and not subject to illegitimate oscillations. In many cases, even valid information must be filtered.

c. *Coverage:* Information must be sufficiently complete in terms of including all the elements that are relevant to a given situation.

d. *Timeliness:* Information must be available when required.

e. *Consistency:* There must be no conflict in the information, which must make sense (for example, the entity must receive an ATC flight plan before and not after the flight). Since information is the basis for the decision, information updating must be synchronised to allow for consistent decisions.

f. *Security and reliability:* Unauthorised intervention in the system must be avoided. Confidential information, especially concerning special operations, must be protected.

g. *Availability:* The level of availability of the system must be compatible with the implementation environment. Lack of availability may give rise to safety problems.

Note: In order to have the best possible information available to support operational efficiency, the exchange of such information should be established within the framework of a memorandum of understanding, starting in the initial stages of CDM implementation. This will help ensure that participants:

a. Provide quality information.

b. Meet their commitments.

c. Define appropriate levels of access to sensitive information.

d. Share data only within the scope of CDM.

9.2 Give airlines the right to decide what information to share or not to share with their passengers. Benefits of the exchange of information in ATFM:

9.2.1 The exchange of information among the parties responsible for aircraft flight planning and operations will increase system capacity and thus improve:

a. The quality and stability of operations.

b. The reliability and capacity of prediction.

c. Traffic synchronisation among the parties involved.

d. Airspace organisation, which is indispensable for maximising capacity and improving the safety of the system.

9.2.2 The use of all possible tools and electronic media for a more effective sharing of information.

Note: Experience worldwide has demonstrated that teleconferences and the electronic exchange of information are the mechanisms recommended for active participation throughout the system. However, each State/service provider may use any available means to encourage sharing of information.

9.2.3 Accurate and timely information to facilitate decision-making within the framework of CDM, the goal being to adjust the procedures, mechanisms and tools in order to improve system performance.

9.3 Information shared between community members and the ATFM centralised unit/FMU/FMP.

9.3.1 *Airspace users* - Cooperation will be achieved through the precise delivery of information from aircraft operators to the ATFM (*e.g.,* flight data) and from the ATFM (on impact and opportunities that may arise). In order to achieve an efficient cooperation, procedures and tools should be developed to provide transparency, efficacy and precision (automation).

9.3.2 *ATM service providers* - The provision of resources will be the starting point for dialogue between ATC and ATFM, in which information about equipment availability and staffing is used.

9.3.3 *Units involved in airspace management (ASM)* - The route network structure, sector design and airspace definition will be essential inputs for CDM. Airspace managers will have to participate actively in the decision-making process (CDM). Their activity has significant impact on flow management measures and the best way of providing the required efficiency would be through the integration of these decisions within the capacity management process. Airspace managers also provide key information for flight planning. In this sense, flight planning activities will make use of the flexibility provided by airspace management, for example, taking into account the airspace when making changes to flight plans filed in advance.

9.3.4 *Aerodrome community* - Airport slot coordination processes will provide valuable information for demand analyses. Airline schedules will provide updated information about flight departure and arrival times. This information will be aligned with the operational data in order to integrate the ATFM process into a timeliness framework. For an effective gate-to-gate management, an ongoing exchange of information between airports, and between airspace managers and ATFM is required.

Chapter 10: CDM Implementation

10.1 The CDM implementation process could be based on the following basic steps:

a. Familiarisation with the CDM concept

In this phase, it is important to recognise that:

- The CDM is a new collaboration culture.

- It is a low-cost, high-benefit process.
- It requires the cooperation of all stakeholders.
- Information must be provided free of cost.
- Commercially sensitive and security information must be handled accordingly.

b. Project configuration

- This new project must have clear objectives and responsibilities.
- The entire community must participate from the beginning.
- Objectives must be adjusted according to the priorities established by the CDM community.
- The project should begin with the information exchange concept.
- An inventory of the information required and the information already available must be developed.
- The systems of each participant must be adapted to the information exchange platform to be developed.
- The community must be educated and trained in the basic concepts and the tasks to be performed in the different processes.
- It must be implemented in a harmonised manner, through the use of guidance material for all participants.

c. Implementation

- A unit must be designated to manage the project.
- The corresponding documentation must be developed.
- A Memorandum of Understanding must be established for participation in CDM.
- Expensive solutions or complicated interfaces are not required.
- The technological platform must be developed based on existing procedures and not *vice versa*.
- A plan must be in place with clear, defined, measurable tasks and realistic target dates.
- All activities must be kept within the CDM framework.
- Small, effective working groups must be created.
- The same team must be maintained for the required process continuity.

d. Measurement of success

- The agreed objectives must be reviewed.
- Appropriate indicators for the objectives must be agreed upon.
- The status of the system must be established before implementation to compare it with the progress made.

Chapter 11: CDM Organisation and Structure

11.1 It is important to note that CDM is not limited to an ATFM service provider; it must be implemented at all ATM facilities of the State, for real-time sharing of relevant and necessary information amongst all stakeholders interested in the progression of a flight. However, this document addresses CDM implementation in the ATFM environment.

11.2 Its flexibility accommodates any existing means of communication, it does not require the investment of valuable resources, and may be adjusted to meet regional and local needs.

11.3 For example, service providers may start involving stakeholders as follows:

a. Scheduling daily meetings
b. Previously establishing an agenda that is of interest to all
c. Discussing in what way will tactical decisions be handled, shared, and disseminated
d. Identifying CDM participants and issuing a *memorandum* of understanding (MOU) (**Appendix B**) that provides guidelines in areas such as the distribution of information, rules and regulations, and how shared leadership will be achieved.
e. Creating working subgroups under the direct leadership and guidance of the CDM organisation, with the specific task of generating solutions.

11.4 It is important to note that despite technological developments in the aviation industry, CDM requires a change in culture and a teamwork approach. But global experience has shown that CDM can be an integral part of success and the building of the future.

11.5 CDM Structure

11.5.1 It is understood that each State and/or service provider will develop a CDM structure that meets its needs. An example of CDM structure is shown below:

a. ATFM authority (or CDM leader) - responsible for CDM implementation;

b. Aerodromes - representatives of aerodrome operators and other parties that participate in the provision and operation of the physical infrastructure required to support take-offs, landings and aircraft handling;

c. Airspace providers - in general, will coordinate between the organisation, CDM and the State;

d. Users - representatives of commercial and general aviation operators;

e. ATM service providers – in general, will coordinate between the organisation, CDM and ATS units;

f. Working group and subgroup - Made up by individuals designated by the CDM or ATFM leader to perform specific tasks related to the solution of ATFM issues.

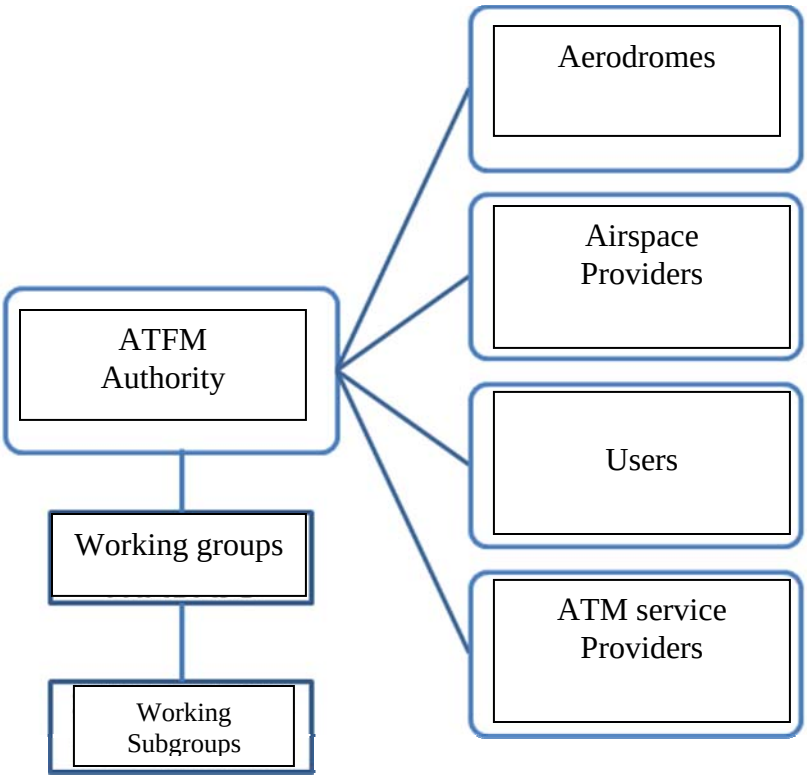


Figure 2: Illustrates a proposed CDM structure

Chapter 12: Conclusions

12.1 As in any collaborative effort, each participant should be aware that this will require some degree of sacrifice, commitment, and a sense of what is best for all and/or the system.

12.2 The participants must be willing to share:

a. Responsibility

b. Resources

c. Accountability

d. Goals

e. Mutual trust

12.3 And, as a direct result of these efforts, the participants may expect, in general:

a. More effective communications

b. A greater exchange of information

c. A more effective decision-making

d. Better solutions to ATFM issues

12.4 CDM entails a series of conceptual changes that will evolve throughout the planning horizon. The key is the notion of use, management and exchange of information, which will gradually generate a significant change of functions for all the participants in the ATM system, thus facilitating safety, economic and efficiency improvements throughout the system.

12.5 It is recognised that, regardless of technological developments in the aeronautical industry, CDM will require a change in culture, a teamwork approach, and will be an integral part of how the future will be defined.

APPENDIX A

PERFORMANCE INDICATORS

GENERAL STRATEGIC OBJECTIVES OF CDM

EXAMPLES

DESCRIPTION OF TABLES

STRATEGIC OBJECTIVE: WHAT IS TO BE ACHIEVED		
STRATEGIC PERFORMANCE CONDUCTOR: THE MEANS TO ACHIEVE THE STRATEGIC OBJECTIVE		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
A CONDUCTOR IS: HOW CAN THE OBJECTIVE BE ACHIEVED	AN INDICATOR IS WHAT WE OBTAIN FROM THE MEASUREMENT IS THE RESULT OF A MATHEMATICAL EQUATION BETWEEN TWO MEASURABLE QUANTITIES ADDITIONALLY, THE UPWARD OR DOWNWARD TREND OF THIS INDEX IS THE INDICATOR ITSELF	THIS ESTABLISHES THE WAY IN WHICH THE INDICATOR IS MEASURED THE PERFORMANCE MESUREMENT IS PRECISELY THE METHOD OF MEASUREMENT

CDM GENERAL OBJECTIVES OF CDM

STRATEGIC OBJECTIVE: Improve airport efficiency		
STRATEGIC PERFORMANCE CONDUCTOR: Improve timeliness and reduce delays		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
IMPROVE THE PREDICTABILITY OF ARRIVALS	PREDICTABILITY OF THE ESTIMATED TIME OF LANDING	COMPARE ESTIMATED AND ACTUAL TIME OF LANDING
IMPROVE THE PREDICTABILITY OF DEPARTURES	PRECISION AND PREDICTABILITY OF THE FORESEEN TIME OF APPROVAL OF ENGINE START	COMPARE TIME OF APPROVAL OF ENGINE START WITH ACTUAL TIME OF TOWING
REDUCE AVERAGE DELAY AT ARRIVAL	AVERAGE DELAYS - INCOMING FLIGHTS PUNCTUALITY INDEX OF INCOMING FLIGHTS	COMPARE ACTUAL AND SCHEDULED TIME OF ARRIVAL AT THE PARKING GATE MEASURE THE MINUTES OF DELAY BY DELAYED MOVEMENT
REDUCE AVERAGE DELAY AT DEPARTURE	AVERAGE DELAYS AT DEPARTURE PUNCTUALITY INDEX OF OUTGOING FLIGHTS	COMPARE ACTUAL AND SCHEDULED TIME OF TOWING

STRATEGIC OBJECTIVE: Reduce environmental impact		
STRATEGIC PERFORMANCE CONDUCTOR: Reduce engine time		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
REDUCE NOISE ON THE GROUND	NOISE ON THE GROUND (ENGINE TIME ON THE GROUND DURING THE DEPARTURE AND ARRIVAL PHASES)	COMPARE ESTIMATED AND ACTUAL TAXIING TIMES

STRATEGIC OBJECTIVE: Optimise the use of available capacity		
STRATEGIC PERFORMANCE CONDUCTOR: Increase airport efficiency		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
FILL THE GAP BETWEEN ACTUAL AND DECLARED CAPACITY	PRECISION OF DECLARED CAPACITY CAPACITY SURPLUS OR DEFICIT	COMPARE NUMBER OF ACTUAL MOVEMENTS TO DECLARED CAPACITY MEASURE THE NUMBER OF DELAYS RESULTING FROM OPERATIONAL CAPACITY

STRATEGIC OBJECTIVE: Improve safety by reducing apron and taxiway congestion		
STRATEGIC PERFORMANCE CONDUCTOR: Reduce the number of incidents in the movement area		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
REDUCE THE NUMBER OF AIRCRAFT MOVING SIMULTANEOUSLY ON THE MANOEUVRING AREA	NUMBER OF AIRCRAFT IN SEQUENCE	MEASURE THE NUMBER OF AIRCRAFT IN SEQUENCE
REDUCE THE NUMBER OF AIRCRAFT INCIDENTS ON THE APRON	NUMBER OF AIRCRAFT INCIDENTS	MEASURE THE NUMBER OF INCIDENTS

OBJECTIVES OF THE AIRPORT COMMUNITY

STRATEGIC OBJECTIVE: Improve the use of infrastructure		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
OPTIMISE THE USE OF PARKING POSITIONS IN GENERAL	TIME OF OCCUPATION OF PARKING POSITIONS	COMPARE THE ACTUAL AND SCHEDULED TIME OF OCCUPATION OF PARKING POSITIONS

STRATEGIC OBJECTIVE: Improve the quality of data for the public		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
PROVIDE THE PUBLIC WITH PRECISE AND TIMELY INFORMATION ABOUT ARRIVALS AND DEPARTURES OF FLIGHTS	PRECISION OF TIME OF ARRIVAL	COMPARE ESTIMATED/SCHEDULED AND ACTUAL TIME OF ARRIVAL TO THE GATE COMPARE ESTIMATED AND ACTUAL TIME OF LANDING
	PRECISION OF TIME OF DEPARTURE	COMPARE ESTIMATED/SCHEDULED AND ACTUAL TIME OF TOWING

STRATEGIC OBJECTIVE: Improve airport slot adherence		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
IMPROVE AIRPORT SLOT ADHERENCE	AIRPORT SLOT ADHERENCE	COMPARE ACTUAL AND SCHEDULED TIME OF ARRIVAL AT THE PARKING POSITION COMPARE ACTUAL AND SCHEDULED TIME OF DEPARTURE FROM PARKING POSITION

OBJECTIVES OF AIR NAVIGATION SERVICE PROVIDERS

STRATEGIC OBJECTIVE: Increase and optimise runway performance		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
FILL THE GAP BETWEEN OPERATIONAL AND DECLARED CAPACITY FOR EACH RUNWAY CONFIGURATION	COMPLIANCE WITH THE DECLARED CAPACITY FOR EACH RUNWAY CONFIGURATION	COMPARE DECLARED CAPACITY TO: ACTUAL RUNWAY OPERATIONAL CAPACITY, ACTUAL DEPARTURE RATE, AND ACTUAL DEMAND. COMPARE DEPARTURE RATE WITH ACTUAL DEMAND (by time/day/week…and for each runway configuration)

OBJECTIVES OF ATFM UNITS

STRATEGIC OBJECTIVE: Compliance with ATFM measures (CTOT).		
PERFORMANCE CONDUCTOR	**PERFORMANCE INDICATOR**	**PERFORMANCE MEASUREMENT**
INCREASE PERCENTAGE OF FLIGHTS LEAVING WITHIN CTOT - 5 AND CTOT + 10	COMPLIANCE WITH CTOT	COMPARE CTOT WITH ACTUAL TAKE-OFF TIME FOR REGULATED FLIGHTS (-5´/+10´) MEASURE THE PERCENTAGE OF MISSED SLOTS (FLIGHTS DEPARTING OUTSIDE OF THE CTOT WINDOW)

NOTE: ***THE ATFM COMMUNITY MAY DETERMINE A LARGER NUMBER OF PERFORMANCE INDICATORS ACCORDING TO ITS EXPECTATIONS, PRIORITIES AND REQUIREMENTS.***

APPENDIX B

EXAMPLE OF A MEMORANDUM OF UNDERSTANDING (MOU) STRUCTURE

1. Objectives of an MoU

The main objectives are:

a. To secure the mechanisms for the exchange of information.

b. Implement procedures to improve predictability.

c. Promote the exchange of information between CDM and the ATFM authority.

d. Adjust the monitoring mechanisms by processing improvement proposals.

2. Obligations of CDM participants

It is important to clarify the general obligations of each participant of the project, such as:

a. Ensure an active participation, recognising project leadership.

b. Cooperate in all functional specifications.

c. Ensure the interaction between systems and the CDM platform to be developed.

d. Provide the platform with the required quality information.

e. Provide a representative throughout the different phases of the project to support and control its development and the implementation of the solutions adopted.

3. Confidentiality clauses

In this section of the MoU, confidentiality clauses must be established according to national regulations in order to create a sense of trust amongst the participants.

4. Validity

The MoU must establish the period of validity and describe the renewal or updating process.

5. General information and scope

This document provides, in general, the elements recommended for inclusion in the MoUs and confidentiality agreements for CDM. These agreements would be of great benefit before starting any CDM implementation, in order to safeguard data distribution.
This document has a limited scope, with a basic description of CDM functional requirements regarding the confidentiality agreements to be used by airport authorities, ATM, aircraft operators, handling and other services.

6. MoUs and confidentiality agreements

a. Safeguarding data exchange

The parties involved in data exchange activities should enter into written agreements to safeguard their interests.

b. Safeguarding data quality

Data precision, quality and delivery must be preserved and agreed by all the parties.

c. Users' trust

The parties must derive clear benefits and agree on the objectives of information exchange.
Transparency amongst the parties will maintain trust and guarantee long-term commitment.

Regular meetings should be coordinated amongst all the parties to discuss the resulting benefits or losses.

Agreements must be flexible enough to make improvements or mitigate deficiencies.

d. Ownership and leadership in the information system

The information system must be managed by a single entity. All the parties must agree, from the beginning, on who will have this responsibility.

e. Responsibility of the process leader

Manage the system on a day-to-day basis.
Promote the continuous improvement of the information system.
Establish rules for the exchange of data.
Develop procedures and regulations.
Coordinate the incorporation of new participants.
Distribute and decide on the ownership of data (who can see what and why).
Make sure confidentiality is not compromised.
Normally, data originators are the only owners of the information.

f. Funding

Costs must be taken into account. The parties shall bear their own participation cost.

g. Term of the agreements

The term of the agreements must be established in the MoU.

h. Example of contents of an MoU

- Parties
- Background
- Purpose
- Authority
- Definitions
- Scope
- Rights and responsibilities
- Exclusion of warranties

- Limits to liability
- Changes and modifications
- Construction of the agreement
- Termination of the agreement
- Effective date
- Notifications
- Point of contact
- Signatures
- Audit requirements

ATTACHMENT APPENDIX B

EXAMPLE OF MEMORANDUM OF UNDERSTANDING MoU USED BY A STATE

Memorandum of Agreement
For
Collaborative Decision Making (CDM)
Exchange of Proprietary CDM Data

Effective Date: March 1, 2009

1.0 Parties

This Memorandum of Agreement (MOA) is entered into by and between the Federal Aviation Administration (FAA) and _____. The parties do hereby agree and obligate themselves to abide by the rights, responsibilities, and other conditions defined in this agreement. Non-compliance with the conditions of this agreement may result in the termination of access to CDM data.

2.0 Authority

The FAA's authority to enter into this agreement is governed by 49 U.S.C. 106 (l) (6).

3.0 Purpose

This Memorandum of Agreement (MOA): (1) establishes the authority, by which the FAA and industry exchange proprietary CDM data, (2) defines the conditions underlying the FAA release of proprietary CDM data, (3) identifies the rights and responsibilities of the parties, and (4) supports the process for managing the release of proprietary CDM data. The exchange of proprietary CDM data is solely intended to support FAA and industry flow management decision making associated with the daily management of aircraft flight operations.

4.0 History

Since the early 1980s, burgeoning growth in the demand for air transportation services within the United States led to correspondingly higher levels of air traffic control (ATC) congestion within the National Airspace System (NAS). To cope with this congestion, the FAA introduced the concept of Traffic Flow Management (TFM) aimed at balancing the demands for ATC services with the operational capacities of the ATC system.

Working with the industry through the RTCA Task Force #3 on Free Flight, the FAA recognized that the then existing ATC centered technologies and TFM techniques used to manage traffic flows had a limited capacity to consider user preferences, priorities, and other economic and non-economic operational considerations. Given the importance of those considerations to the health of the aviation industry, the FAA responded with a research program aimed at developing new technologies and associated

procedures that would expand the operational flexibility of both the FAA and NAS users. Building on the Aircraft Situation Display to Industry (ASDI) data feed that provided dispatchers and other aircraft fleet managers with filtered Aircraft Situation Display (ASD) flight information, a new TFM process, referred to as Collaborative Decision Making (CDM), was developed. The CDM process, which is based upon the ideas of data sharing and distributed decision making, results in TFM decisions and actions that are both economically and operationally sound.

5.0 Background

In the CDM process, individual industry CDM Participants provide specific data types to the CDM database. The industry participants consider much of that data to be proprietary. The FAA: (1) aggregates and processes that data into a form that is appropriate for use in the CDM process and (2) distributes that processed data to all government and industry CDM participants. Since proprietary industry CDM data is the "property" of the data contributor, any release of raw or processed CDM data must be authorized by the contributor. The distribution of proprietary CDM data is considered to be in compliance with this requirement if it is handled in accordance with Appendix A of this document.

As of May 1998, the CDM industry participants have identified the Air Transport Association of America (ATA) as their single Point of Contact (POC) to the FAA for CDM matters.

6.0 Definitions

6.1 Traffic Flow Management (TFM): The Air Traffic Management (ATM) operational function that balances the aviation industry demand for air traffic control services with the capacities and capabilities of the air traffic control (ATC) system

6.2 Collaborative Decision Making (CDM): The TFM operational philosophy and associated technologies and procedures that enable FAA and the aviation industry to collaboratively manage strategic responses to NAS operational constraints in a manner that balances operational efficiency with aviation safety.

6.3 National Airspace System (NAS): The personnel, airspace, aircraft, equipment, and any and all other aviation components that comprise the United States' aviation system.

6.4 NAS User: A person or organization that operates or manages aircraft operations within the NAS utilizing NAS resources.

6.5 ASD data: Near real time flight and aircraft position data used by FAA traffic flow managers to monitor and strategically manage aircraft flows within the air traffic control (ATC) system.

6.6 ASDI Data: The filtered ASD data that is provided as a one-way data feed to airlines and other aviation related industries and institutions. For security purposes, military and other sensitive aviation operations are filtered out of the ASDI data stream.

6.7 CDM Data: Proprietary industry generated data elements provided as input to the CDM process. This also includes FAA generated data that is based upon the proprietary industry data (e.g., aggregate demand lists) and retains its proprietary nature.

6.8 Industry CDM Participant: A NAS user organization that: (1) provides raw industry data elements to the CDM database, (2) receives processed CDM data from the FAA, and (3) collaboratively works with the FAA traffic flow management function in responding to NAS operational constraints.

6.9 CDM Service Provider: A vendor under contract to a CDM Participant that provides the communications network that enables the exchange of TFM information between the FAA and the CDM Participants.

6.10 Industry CDM Point of Contact (POC): The consensus aviation industry entity identified by the individual industry CDM Participants as being the single point of contact regarding CDM matters. The industry POC also provides industry CDM Participants with guidance and other support relating to the CDM process and the conditions of this MOA. For CDM matters relating to this MOA, the industry CDM POC is the Air Transport Association of America (ATA).

7.0 Rights and Responsibilities

7.1 Federal Aviation Administration (FAA)

The FAA shall:

7.1.1; provide the CDM Participant with specifications, communications protocols, equipment requirements, interface requirements, data quality standards, message formats, government software, key management and other relevant technical information and support as necessary to transmit, receive, interpret, and analyze CDM data. The FAA shall also provide a point of contact for twenty-four hour technical support.

7.1.2; encrypt FAA processed CDM data in accordance with the current industry standard.

7.1.3; provide the CDM Participant or the Participant's CDM Service Provider with physical access to the encrypted CDM data.

7.1.4; release encrypted CDM data to CDM Participants only after: (1) authority to release that data has been conveyed through the industry CDM POC and (2) the CDM Participant has demonstrated the capability to provide raw CDM data consistent with the documented data quality standards defined by the FAA.

7.1.5; release encrypted CDM data in accordance with the industry data security and filtering requirements identified in Appendix A for the specific data types listed there.

7.1.6; provide processed CDM data consistent with the accuracy, reliability, maintainability, and availability of the operational traffic management system and/or other processing and communications capabilities,

7.1.7; prohibit FAA vendors, support contractors, or other FAA organizations from utilizing CDM data to conduct any analyses or product development without explicit industry authorization.

7.1.8; have the sole right to relocate, upgrade, and/or update the CDM data stream in order to take advantage of advances in technology and for other reasons. The FAA shall provide notice of such changes not less than sixty (60) days prior to their implementation.

7.1.9; have the right to identify CDM Participants not in compliance with, or in violation of, this agreement and may interrupt, or direct the interruption of, the CDM data stream until such time that compliance is demonstrated to the satisfaction of the FAA CDM Point of Contact (POC) identified in paragraph 16.0 below.

7.1.10; have the right, with timely and appropriate advance notification and coordination, to modify and amend this agreement if it is in the interest of the United States Government, the aviation industry, or the general public.

7.1.11; have the right to rate and identify CDM Participants not in compliance with the expected level of performance as specified in Appendix B of this agreement.

7.2 CDM Participant

The CDM Participant shall:

7.2.1; acquire and maintain the hardware, software, communications, facilities, training, and any and all other resources needed to transmit, receive and interpret the CDM data. In the event the CDM data stream is relocated, upgraded, updated, and/or modified, the CDM Participant shall be responsible for providing and maintaining the hardware, software, communications, facilities and any and all other resources needed to continue to transmit, receive and interpret the CDM data.

7.2.2; provide industry generated CDM data to the FAA CDM database consistent with the data quality standards defined by the FAA; and consistent with the accuracy, reliability, maintainability, and availability of the CDM Participant's operational system and/or other processing and communications capabilities.

7.2.3; clearly indicate on any and all research, development, analyses, conclusions, or capabilities commissioned by the CDM participant and based on CDM data that these products and results are not guaranteed, sponsored, warranted, or endorsed by the FAA.

7.2.4; ensure that all contracts related to CDM data: (a) reflect the rights, responsibilities, exclusion of warranties, limitation of remedies, indemnification, and other conditions defined in this MOA; (b) prohibit contacting the FAA CDM POC or the Air Traffic Control System Command Center (ATCSCC) in the event of technical or system problems, and (c) prohibit contacting the FAA CDM POC, any FAA air traffic control facility, or the ATCSCC regarding operational traffic flow management matters.

8.0 Exclusion of Warranties

All warranties, expressed or implied, are excluded from this agreement and shall not apply to the data or services that the CDM Participant, CDM Service Provider, or any other data recipient receives under this agreement. There is no warranty of merchantability or of fitness for a particular purpose for the data or services that the CDM Participant, CDM Service Provider, or any other data recipient receives under this agreement.

9.0 Limitation of Remedies

The FAA shall not be liable to the CDM Participant, CDM Service Provider, or any other data recipient for any loss, damage, claim, liability, expense, or penalty, or for any indirect, special, secondary, incidental, or consequential damages deriving from the use of the CDM data.

10.0 Indemnity

The CDM Participant, CDM Service Provider, and/or any other data recipient agrees to indemnify and hold harmless the Government and their respective officers, employees, and agents, from and against all

claims, demands, damages, liabilities, losses, suits, and judgments (including all costs and expenses incident thereto), which may accrue against, otherwise be chargeable to the Government by reason of, or as a direct and proximate result of, that CDM Participant's or CDM Service Provider's use of the CDM data or software received under this agreement.

Software Data Rights: All data, software, and documentation, furnished by the Government to the CDM Participant pursuant to this MOA, are provided on an "as is" basis.

11.0 Changes and Modifications

Changes and/or modifications to this agreement shall be in writing and signed by the original FAA signatory or his representative, designee, or successor. The modification shall cite the subject MOA, and shall state the exact nature of the modification. No oral statement by any person shall be interpreted as modifying or otherwise affecting the terms of this agreement.

12.0 Disputes

Where possible, disputes will be resolved by informal discussion between the parties. In the event the parties are unable to resolve any disagreement through good faith negotiations, the dispute will be resolved by the Director, System Operations, Air Traffic Control System Command Center (ATCSCC). The decision is final unless it is timely appealed to the FAA Administrator, whose decision is not subject to further administrative review and, to the extent permitted by law, is final and binding.

13.0 Construction of the Agreement

This agreement is an "other transaction" issued under 49 U.S.C. 106(l) and (m) and is not a procurement contract, grant or cooperative agreement. Nothing in this agreement shall be construed as incorporating by reference or implication any provision of Federal acquisition law or regulation.

14.0 Termination of this Agreement

Any party may terminate its participation in the CDM activity under this MOA by written notice to the remaining parties provided no termination may be effective in less than ninety (90) days from the date of such written notice.

If the CDM Participant fails to abide by the requirements of this agreement and its failure is not cured within five (5) working days of the initial notice of noncompliance, the CDM Participant's access to data covered under this agreement may be terminated immediately by the FAA.

Whenever written notice of termination is issued by or received by the CDM Participant, the CDM Participant shall immediately return all Government equipment (if any), software and documentation that the Government issued to the CDM Participant under this MOA.

15.0 Effective Date

This agreement shall be effective on the date that the FAA signatory below executes it and shall remain in effect until terminated.

16.0 FAA Point of Contact (POC)

Written notices to the FAA shall be sent to the FAA CDM POC at the address shown below.

Federal Aviation Administration
David J. Hurley Air Traffic Control System Command Center
Director, System Operations
13600 EDS Drive
Herndon, VA 20171

ATTN: CDM Point of Contact

17.0 Industry Contact

This MOA will be updated as needed. Written/electronic notices to the CDM Participant will be provided. The mail and electronic address for notices are:

Name: _____

Address: _____

_____

E-mail address _____

Phone: _____

18.0 Approval Signatures

CDM Participant	**Air Traffic Operations**
Signature	Signature
	Mike Sammartino
Name (Printed)	Name (Printed)
	Director, System Operations ATCSCC
Title	Title
Date	Date

CDM Data Service Provider

Appendix A

CDM Data Security Conditions

CDM Data Type	Industry Security Requirements
Aggregate Demand List (ADL)	(1) Encrypt messages (2) Filter the following data elements: (1) Carrier Identification (2) Flight number (3) Departure airport (4) Aircraft type (not weight category) * NOTE: Individual CDM Participants will receive the data elements for their own operations. (3) An exception to item (2) above would provide unfiltered data to users who wish to participate in Integrated Program Modeling and who meet all 4 requirements below: 1. The requesting airline limits the availability of this data to authorized CDM participants only as defined in section 6.8 of this document. 2. Submits a plan that limits the unauthorized access to this data that is under the control of the signatory of this memorandum of agreement. 3. Acknowledges that this data stream may be interrupted by the FAA under section 7.1.9 of this document if the requesting airline is found not to be in compliance with these limitations. 4. Users would need to resign the MOA on an annual basis to continue use of unfiltered data until hub site changes can accomplish a technical solution to the issue of unfiltered data. This unfiltered data will be made available until encryption or filtering mechanisms are in place.
Industry arrival/departure priorities	Not released outside of FAA Air Traffic Operations

Appendix B

Data Quality Report Card

Data quality is one of the primary concerns of the traffic flow management community. The Data Quality Report Card (DQRC) provides a measure of the quality of the data feed for each CDM participant. Poor data quality can negatively impact the system by creating inaccurate traffic demand predictions.

The Data Quality web site and database generate three metrics (time-out cancels, cancelled but flew, and undeclared). Each of the metrics relate directly to the ability of ETMS to accurately predict traffic demand within the traffic management planning time frame. The DQRC metrics are as follows:

- ***Time-out cancels*** – A time-out cancel is a flight that ETMS expects to operate, but either never does, or operates well after its ETD. ETMS has no alternative but to wait for some time period after the expected departure time and eventually drop the flight from the demand predictions. The current rule is that a flight with a flight plan or a CDM flight create message is time-out cancelled by ETMS 90 minutes after its ETD; a flight only with OAG data is time-out cancelled 10 minutes after its ETD. A sample scenario of a time-out cancel is: the participant submits a CDM create message for a flight, does not operate the flight, and never sends a cancel message for a flight. If a participant sends a cancel message for a flight, it will not be considered a time-out cancel. Time-out cancels cause ETMS to over-predict the traffic demand. *For grading purposes, time-out cancels are computed as a percentage of all flights created in the ETMS database for the participant.*
- ***Cancelled-but-flew flights*** – A cancelled-but-flew flight is a flight that the participant cancels but that ends up operating. A sample scenario of a cancelled-but-flew is: the participant sends a CDM create message, files a flight plan, sends a CDM cancel message, and then ETMS gets a departure message for the flight from ATC. If the participant cancels a flight but re-instates it with a CDM message before it operates, the flight is not considered a cancelled-but-flew flight. Cancelled-but-flew flights cause ETMS to under-predict traffic demand. *For grading purposes, cancelled-but-flew flights are computed as a percentage of all flights cancelled by the participant.*
- ***Undeclared flights*** – An undeclared flight is a flight that operates without prior notice to ETMS. The prior notice can be either the flight being in the OAG schedule, or the participant sending a CDM create or modify message for the flight. A sample scenario of an undeclared flight is simply a flight that operates and for which a flight plan is the first notification that ETMS received of this flight. Undeclared flights cause ETMS to under-predict the demand. *For grading purposes, undeclared flights are computed as a percentage of all of the participant's flights that operate.*

CDM participants will be expected to have no unacceptable grades on any metric during the 6-month time span, and would be expected to make corrective actions to improve marginal performance to at least a satisfactory level. Some month-to-month fluctuation is to be expected, so the primary grade for each category will be a six-month, sliding average. Unacceptable averages for any category will trigger communications between ATCSCC Quality Assurance resources and the CDM participant to develop plans for improvement.

The report card will be produced monthly and distributed to a designated representative for each airline. Each airline will only be able to receive and view its own data. The data may be distributed to all participants and within the FAA if the data is not directly associated with airlines by name. The metrics are currently tracked on the CDM Data Quality website, so CDM participants can access the website to view data not associated with specific airlines.

Grading Criteria

The grading scheme is based on average performance and variability for each metric across all CDM participants. Airlines performing significantly better than average (that is, that have a lower percentage score for a metric) will receive good grades, and those performing significantly worse than average will receive marginal or unacceptable grades.

The list below shows the initial criteria for determining letter grades. This data was computed by Volpe and represents a 6-month span from December 2003 through May 2004. The averages and standard deviations of scores for each metric were computed and the following conversion was applied:

A = At least .5 standard deviations better (lower) than average
B = Between .5 standard deviations better and .5 standard deviations worse than average
C = Between .5 standard deviations and 2.5 standard deviations worse than average
F = More than 2.5 standard deviations worse than average.

Based on the criteria above and the computed averages and standard deviations, the following table shows the letter grade criteria:

	A	**B**	**C**	**F**
Time Out Cancels (% of Planned Flights)	% $\leq$ .8	.8 < % $\leq$ 2.5	2.5 < % $\leq$ 6.2	6.2 < %
Cancels that Flew (% of Airline Cancels)	% $\leq$ 1.2	1.2 < % $\leq$ 3	3 < % $\leq$ 6.6	6.6 < %
Undeclared Flights (% of Flights that Operated)	% $\leq$ .7	.7 < % $\leq$ 2.1	2.1 < % $\leq$ 4.9	4.9 < %

Table 1. Percent to Letter Grade Conversion Table

The criteria will be re-calculated each January using the available data from the previous 6-month period (July through December). CDM participants will be advised of any changes in the grading criteria.

APPENDIX C

CDM MEETINGS

The purpose of the CDM planning meetings is to attain an effective and collaborative management of ATM system improvements, enabling the ATFM community to monitor the expected results.

The CDM planning meeting framework will permit the consolidation of tasks to be performed with their corresponding responsible parties, and the follow-up of the results and reports generated.

PLANNING

The following should be taken into account for the implementation of CDM meetings:

1. Develop a strategic plan, agreed amongst the CDM participants. This plan shall include a timetable of activities, and goals.
2. Develop a tactical plan, with short-term goals aligned with the strategic plan.
3. The plan shall include the tasks, broken down for each responsible working group.
4. Each working group shall keep the timetable of activities (progress) up-to-date, and ensure compliance with the strategic plan.
5. Assign work priorities in order to optimise results in terms of the most beneficial efficiency and safety objectives, meeting the needs of the majority of participants.
6. Specify the use of teleconferences for virtual meetings in order to expedite progress on certain topics.
7. Develop a timetable of monthly or biweekly meetings as required.
8. Develop the mechanisms required to conduct effective extraordinary meetings.
9. Adjust the meeting agenda with an established time in advance to allow for the preparation of each meeting.
10. Formalise the decision-making process for the analysis, consideration and approval of proposals.
11. Standardise the reports to be submitted by the working groups.
12. Implement a biyearly meeting to discuss the strategic plan and approve the tactical plan to be developed.
13. Share the lessons learned during the fulfilment of the agreed tasks.
14. Prepare a compilation of tasks for follow-up purposes, containing basically:

- Task reference number.
- Task originator.
- Start date of the task.
- Group responsible.
- Description of the task.
- Sub-task and responsible party.
- Status of development.
- Target date of the task.
- Remarks and links.

For the compilation of tasks, an updating process shall be established and it shall be conducted with a given frequency (for example, every month).

APPENDIX C

ACTION PLAN FOR THE IMPLEMENTATION OF ATFM AT SAM AIRPORTS

A: AIRPORT				
Task description	**Start**	**End**	**Responsible party (designate individual or organisation in charge)**	**Remarks**
1. Airport demand/capacity analysis	**Sep 2008**	**Apr 2010**		
1.1 Prepare ATFM survey	N/A	Aug 2008	Project RLA/06/901 Regional Office	**Completed**
1.2 Send survey to the States of the Region	Aug 2008	SAM/IG/2	Regional Office	**Completed**
1.3 Analyse the methodology presented by Brazil for estimating airport capacity	June 2008	SAM/IG/2	ATFM/IG	**Completed** and analyzed through WP/08, WP/16.
1.4 Send response to survey	N/A	SAM/IG/2	States	**Completed** Except for French Guyana, Guyana, and Suriname.
1.5 Assess survey results	N/A	SAM/IG/3	ATFM/IG	**Completed**
1.6 Course offered by Brazil on Airport Capacity Estimate	Mar 2009	Mar 2009	Brazil	**Completed** The course was carried out from 23 – 27 March 2009, as planned
1.7 Development of the Methodology for the Calculation of Airport and Airspace Capacity in the SAM Region	Nov 2008	Jul 2009	Brazil and USA RLA/06/901	**Completed** Presented at SAM/IG/4
1.8 Carry out exercise of Calculation of Runway Capacity in the SAM Region as per the Course offered by Brazil	Sept 2009	SAM/IG/7	States	**Valid** Through Conclusion SAM/IG/4-5, the guidance material for the application of a common

Note:

E	States
SAM/IG	SAM Implementation Group
ATFM/IG	ATFM Implementation Group
OR	Regional Office

A: AIRPORT				
Task description	**Start**	**End**	**Responsible party (designate individual or organisation in charge)**	**Remarks**
				methodology for the calculation of airport and ATC sectors capacity was approved. Bolivia, Brazil, Colombia, Paraguay, Peru and Venezuela presented their preliminary exercise.
1.9 Carry out Calculation of Airport and Airspace Capacity of main airports by States.	Sept 2009	SAM/IG/7	States	**Valid** Brazil, Paraguay and Peru presented the data.
1.10 Identify airports where periods exist where the demand is greater than existing capacity including simulations, if necessary, by States.	Sept/Oct 2009	SAM/IG/7	States	**Valid** Brazil, Paraguay and Peru presented the data.
1.11 Determine operational factors affecting airport demand and capacity to optimise utilisation of existing capacity, including simulations, is necessary.	Sept/Oct 2009	SAM/IG/7	States	**Valid** Brazil, Paraguay and Peru presented the data.
1.12 Present the conclusions on existing airport capacity	**N/A**	SAM/IG/7	States	**Valid**
2. Coordination with the ATM community				
2.1 Present initial AIC model	SAM/IG/2	SAM/IG/2	ATFM/IG	**Completed**
2.2 Publish initial AIC	SAM/IG/2	Next AIRAC date/2009 after SAM/IG/3	States	**Completed**

A: AIRPORT				
Task description	**Start**	**End**	**Responsible party (designate individual or organisation in charge)**	**Remarks**
2.3 Promote seminars to the ATFM community, taking into account the CDM concept for ATFM implementation, and begin the relevant coordination		December 2010	States	**Valid** On 29 to 31 March 2010, the First CDM Workshop was carried out in Rio de Janeiro, Brazil, with the participation of 27 experts. The second ATFM/CDM Workshop will be carried out in Rio de Janeiro during 26 and 27 November 2010
2.4 Inform the GREPECAS CNS/ATM Subgroup	SAM/IG/3	Permanent	N/A	**Valid** The CNS/ATM/SG Meeting (Lima, Peru 15 to 19 March 2010) received information on the progress in the ATFM area up to date in the SAM Region (see 5.4)
3. Infrastructure and database		**Aug 2008**		**Valid**
3.1 Send the results of the survey developed by the hired expert to the Automation Group.		Dec 2008		**Completed**
3.2 Send to the Automation Group the information obtained by the expert hired on the data bases used in the Brazil, United States and Eurocontrol units	Jan 2009	TBD		**Valid**
3.3 Coordinate implementation activities with the Automation Group			ATFM/IG	**Permanent**
4. Policy, standards, and procedures			**Nov 2008**	
4.1 Hiring of an expert to draft the manuals on ATFM measures for airports and FMU and FMP procedures			N/A	Task included in 4.2

A: AIRPORT				
Task description	**Start**	**End**	**Responsible party (designate individual or organisation in charge)**	**Remarks**
4.2 Hiring of an expert for the elaboration of the ATFM Manual		February 2009	Regional Office	**Completed**. Task developed from 6 to 17 July 2009
4.3 Detailed development of ATFM Manual chapters	Dec 2008	SAM/IG/5	Regional Office	**Completed** Approved partial draft, including ATFM concepts for airspace and airports at SAM/IG/2 Meeting. Presented at SAM/IG/4
4.4 Detailed development of the second part of ATFM Manual Chapters.	Dec 2009	Jun 2010	Regional Office (RLA/06/901)	**Completed** The ATFM Manual was analysed from 4-15 October, with the assistance of experts from Colombia and Brazil and some changes were introduced, in order to improve its structure.
4.5 Present the model AIC Supplement		SAM/IG/6	ATFM/IG	**Completed** With the assistance of an expert from Peru, an AIP Supplement Model, to be used by States as reference, was prepared and developed (see SAM/IG/6 WP/08).
4.6 Approve the AIC Supplement		SAM/IG/6	ATFM/IG	**Completed** The AIC supplement model was approved by SAM/IG/6
4.7 Publish the AIP Supplements		SAM/IG/7	States	**Valid**
5. Training				
5.1 Draft ATFM training plans and submit them		SAM/IG/7	States	**Valid**
5.2 Train the team on decision-making at airports		December 2011	States	**Valid**

A: AIRPORT				
Task description	**Start**	**End**	**Responsible party (designate individual or organisation in charge)**	**Remarks**
5.3 Hiring of an expert to draft Manual on the Introduction to ATFM for the ATM Community		TBD	Regional Office	**Completed** The ATFM Manual was prepared and submitted to CNS/ATM/SG. Guidelines to inform ATM community on ATFM and CDM general concepts. These guides may be provided in courses, seminars or others.
5.4 Present and assess the Manual for the Introduction to ATFM for the ATM Community		SAM/IG/6	RLA/06/901	**Completed** Through the hiring of experts, the ATFM manual was developed. The CNS/ATM/SG Meeting adopted the manual for the CAR and SAM Regions. It has been planned to develop a second part of such manual.
5.5 Train the members of the ATM community in the CDM and ATFM concepts		TBD	States	**Completed** The ATFM SAM Course was held in Rio de Janeiro, Brazil, from 22 to 26 March, 18 experts participated and the holding of tele-conferences was agreed, same which started on 12 April with excellent results. The Second SAM ATFM Course will be held in Rio de Janeiro from 23 to 25 November 2010.
5.6 Train FMP/FMU staff for application of ATFM measures for airports		SAM/IG/7	States	**Valid**
5.7 Monitor the training of the ATM community		SAM/IG/7	States	**Valid**

A: AIRPORT				
Task description	**Start**	**End**	**Responsible party (designate individual or organisation in charge)**	**Remarks**
6. Final implementation decision				
6.1 Identify and review factors that may affect the implementation decision		SAM/IG/7	ATFM/IG	**Valid**
6.2 Declare the pre-operational implementation in the defined area		SAM/IG/7	States	**Valid**
6.3 Declare the final operational implementation in the defined area		SAM/IG/9	States	**Valid**
7. Monitor system performance				
7.1 Draft the ATFM post-implementation follow-up programme at airports	SAM/IG/6	SAM/IG/7	ATFM/IG	**Valid**
7.2 Implement the ATFM post-implementation follow-up programme at airports	SAM/IG/7	SAM/IG/9	States	**Valid**
Tentative pre-operational implementation date		SAM/IG/7	**States**	**Valid**
Tentative definitive implementation date		**N/A**	**Dec 2011**	**Valid**

ACTION PLAN FOR ATFM IMPLEMENTATION IN THE SAM REGION				
B- AIRSPACE (ATC Sector)				
Task description	**Start**	**End**	**Responsible party(designate individual or office in charge)**	**Remarks**
1. Airspace demand and capacity analysis				
1.1 Analyse the methodology to estimate ATC sector airspace capacity presented by Brazil	Jun 2008	SAM/IG/2		**Completed**
1.2 Prepare an airspace demand survey	TBD	TBD		
1.3 Attend the course on Airspace Capacity Estimate **(ATC Sector).**	Mar 2009	States		**Completed**
1.4 Carry out the States estimate airspace ATC sector capacity at the major airports	**Sept. 2009**	**SAM/IG/7**		**Valid**
1.5. Identify airspace sectors where demand sometimes exceeds capacity, including simulations by the States, if necessary	**TBD**	**TBD**		
1.6 Identify factors affecting airspace demand and capacity in order to optimise the use of existing capacity, including simulations if necessary	**TBD**	**TBD**		
1.7 Present conclusions on the existing airspace capacity.	**TBD**			
2. Coordination with the ATM community	**Sep 2008**	**Aug 2009**		
2.1Consider by the ATM community the implementation of ATFM in airspace	Sep 2008	Dec 2010		**Valid**
3. Infrastructure and database	**TBD**	**Dec 2013**		
3.1 Send requirements to the Automation Group, as stipulated in Appendix B of the ATFM CONOPS	**TBD**	**TBD**		**Valid**
3.2 Coordinate implementation activities with the Automation Group	N/A	Dec 2013		

ACTION PLAN FOR ATFM IMPLEMENTATION IN THE SAM REGION				
B- AIRSPACE (ATC Sector)				
Task description	**Start**	**End**	**Responsible party(designate individual or office in charge)**	**Remarks**
4. Policy, standards, and procedures	**TBD**	**Jun 2013**		
4.1 Develop ATFM policies, taking into account the objectives and principles established in the CAR/SAM ATFM CONOPS	**TBD**	**TBD**		
5. Training	**TBD**	**May 2013**		
5.1 Train the team on airspace data collection	Jun 2009	March 2011	States	**Valid** A first course was carried out in March 2009. A Second course on runway capacity and ATC sector will be held in Rio de Janeiro, Brazil, in March 2011.
5.2 Air Traffic Flow Management Course	Mar 2010	Nov 2010	Brazil	**Valid** Hosted by RP RLA/06/901. The Second ATFM Course will be held in Rio de Janeiro, Brazil, from 23 to 25 November 2010.
5.3 Train personnel in ATFM strategic measures for airspace	**TBD**	**TBD**		
5.4 Prepare plans and ATFM training material	**TBD**	**TBD**		
5.5 Conduct training of personnel involved.	**TBD**	**TBD**		
6. Final implementation decision	**N/A**	**Sep 2013**		**Valid**
6.1 Analyse factors affecting the implementation decision	**N/A**	**TBD**		
6.2 Declare pre-operational implementation in the area defined	**N/A**	**TBD**		

ACTION PLAN FOR ATFM IMPLEMENTATION IN THE SAM REGION				
B- AIRSPACE (ATC Sector)				
Task description	**Start**	**End**	**Responsible party(designate individual or office in charge)**	**Remarks**
6.3 Declare definitive operational implementation in the area defined	**N/A**	**TBD**		
7. Monitor system performance	**TBD**	**N/A**		
7.1 Draft ATFM post-implementation follow-up programme	**TBD**	Aug 2013		**Valid**
7.2 Implement ATFM post-implementation follow-up programme	Dec 2013	N/A		
Tentative pre-operational implementation date	**N/A**	**Jul 2013**		**Valid**
Tentative definitive implementation date	**N/A**	**Dec 2013**		**Valid**

APPENDIX E

Telephone:

Fax:

E-mail:

S T A T E

AERONAUTICAL INFORMATION

SERVICE

A I C

N° XX / XX

XX XX , 2010

IMPLEMENTATION OF THE AIR TRAFFIC FLOW MANAGEMENT (ATFM) SERVICE

1.- PURPOSE

1.1 The purpose of this Aeronautical Information Circular (AIC) is to provide information about the progress made in the implementation of the air traffic flow management (ATFM) service in (STATE), as a way to encourage the participation and cooperation of stakeholders, specifically:

a) Aircraft operators;

b) Air traffic service providers;

c) Airspace management units;

d) Airport operators; and

e) Other entities of the ATFM community.

1.2 This AIC also provides information about the new concepts embodied in the CAR/SAM ATFM Manual.

1.3 The publication of this AIC does not preclude other dissemination activities, such as the development of supplements or amendments to the Aeronautical Information Publication (AIP – xxx) or the issuance of specific regulations concerning ATFM implementation.

1.4 This circular supersedes AIC xx / 09 dated xx xx 2009.

2. BACKGROUND

2.1 The Tenth Air Navigation Conference held in 1991 at the ICAO Headquarters in Montreal, Canada, endorsed the ICAO CNS/ATM systems. That same year, the Caribbean/South American Regional Planning and Implementation Group (GREPECAS) started working towards the regional application of this new air navigation service concept.

2.2 Subsequently, at the Eleventh Air Navigation Conference (ANConf/11, Montreal, September 2003), the States endorsed and approved the new ICAO global ATM operational concept, which fosters the implementation of a service management system that permits a seamless regional airspace through the application of a series of ATM functions.

2.3 In turn, the analysis conducted by UNDP/ICAO Project RLA/98/003 concluded that, although, in general, there was no traffic congestion in the CAR/SAM Regions that required complex flow management, there were some congested areas at some airports and airspace sectors that should be avoided, particularly during special periods at a certain hours.

2.4 Consequently, the GREPECAS/12 meeting considered that the early implementation of ATFM would 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.

2.5 The first meeting of the ATFM/TF, held in 2005, began the planning process towards the implementation of a centralised ATFM unit in the CAR/SAM Regions. Likewise, the GREPECAS/13 meeting (November 2005) considered that, throughout the implementation process, ATFM units should jointly develop the procedures so as not to jeopardise safety. This implies the establishment of a regional and inter-regional strategy to facilitate and harmonise the implementation process.

2.6 The ATFM/2 meeting, held in 2006, was presented with the document containing the Air Traffic Flow Management Operational Concept for the CAR/SAM Regions (ATFM CONOPS), which provides a high-level description of the service to be provided in the CAR/SAM Regions within a defined time horizon. It also reflects the expected order of possible events and should help planners design and gradually develop the ATFM system.

2.7 In April 2007, the GREPECAS/14 meeting formulated a conclusion on the adoption of the CAR/SAM ATFM operational concept.

2.8 Finally, in March 2010, the CNS/ATM/SG/1 meeting of the GREPECAS CNS/ATM Subgroup presented the CAR/SAM Manual on Air Traffic Flow Management, which was adopted by the CAR and SAM Regions.

3.- REFERENCE DOCUMENTS

- Air Traffic Flow Management Operational Concept for the Caribbean and South American Regions (CAR/SAM ATFM CONOPS) (June 2007)
- Manual on Air Traffic Flow Management for the Caribbean and South America (March 2010)

4.- TERMINOLOGY

4.1 In order to have a better understanding of ATFM, some terms and expressions are described below:

a. **ATFM** Stakeholders - The ATFM stakeholder community includes the organisations, bodies or entities that could participate, collaborate, and cooperate in the planning, development, use, regulation, operation, and maintenance of the ATFM system.

These include:

- **The set of aerodromes** - Air traffic control authorities, the head of the aerodrome, commercial operators, the military and the general aviation, and other parties involved in the provision and operation of the physical infrastructure required to support the take-off, landing, and ground handling of aircraft.
- **Airspace providers** - In general terms, it refers to the Contracting States/Territories as owners of the airspace and legally empowered to grant or deny access to their sovereign airspace. The term can also be applied to State organisations entrusted with the establishment of standards and guidelines on airspace use.
- **Airspace users** - It refers to commercial, military, and general aviation operators that use the sovereign airspace of the States/Territories/Organisations.

- **ATM service providers** - All of the organisations and their staff (for example, controllers, engineers, technicians) involved in the provision of ATFM services to airspace users.

- **Military aviation** - It refers to the staff, aircraft, and equipment of the military organisations that are critical for the security of States/Territories.

- **International Civil Aviation Organization (ICAO)** - Considered as the only international organisation capable of efficiently coordinating global ATM implementation activities.

b. **Air traffic flow management (ATFM**) - A service established with the purpose of contributing to a safe, orderly, and expeditious air traffic flow, maximising ATC capacity and ensuring compatibility between traffic volume and the capabilities declared by the corresponding ATC authority.

c. **Air traffic management (ATM**) - A service that comprises airspace management, air traffic flow management and air traffic services.

d. **The ATM community** - All of the organisations, bodies and entities that could participate, collaborate, and cooperate in the planning, development, use, regulation, operation, and maintenance of the ATM system.

e. **Air traffic management system** - A system that provides ATM through the integration and cooperation of staff, information, technology, facilities and services. It also includes airborne and space-based communication, navigation and surveillance support.

f. **Air traffic volume** - The number of aircraft in a given airspace or aerodrome movement area in a given period of time.

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

h. **Declared capacity (for ATFM purposes**) – A measure of the ability of the ATC system or any of its sub-systems or operating positions to provide service to aircraft during normal activities. It is expressed as the number of aircraft entering a specified portion of airspace in a given period of time, taking into account meteorological conditions, ATC unit configuration, staff and equipment available, and any other factors that could affect the workload of the controller responsible for the airspace.

i. **Regional ATFM centre** - A flow management unit responsible for air traffic flow management in multiple area control centres.

j. **Collaborative decision-making** - An operations philosophy and the associated technologies that allow those responsible for traffic management and aeronautical industry representatives to respond to airspace system restrictions on a timely basis.

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

l. **Efficiency** - The ratio between the cost of the ideal flight and the cost of the flight with procedural restrictions.

m. **Flow management unit (FMU**) - FMUs monitor and balance traffic flows in their areas of responsibility, according to traffic management guidelines. The FMU is delegated the authority to direct traffic flows and implement the approved TMIs together with, or by indication of, the oversight authority.

n. **Flow management position (FMP**) - Working position established within an appropriate traffic control unit to ensure the necessary interface between the local ATFM functions and the other FMUs and/or a centralised ATFM unit.

o. **ATM homogeneous area** - Airspace with a common ATM interest, based on similar characteristics in terms of traffic density, complexity, air navigation system infrastructure requirements and other specified considerations, where a common, detailed plan will foster ATFM implementation.

p. **Main traffic flow** - The concentration of significant air traffic flow on the same or similar flight paths.

q. **Routing area** - An area that encompasses one or more main traffic flows, which is defined with a view to developing a detailed plan for the implementation of ATM systems and procedures.

r. **Traffic management initiatives** - Techniques used by those responsible for traffic management for balancing air traffic demand and available capacity.

5. IMPLEMENTATION STRATEGY

5.1 The ATFM service will be established in order to optimise the use of available airspace and airport capacity, and to improve air traffic flow management processes. It will be based on transparency and efficiency, ensuring flexible and timely capacity, in keeping with ICAO guidelines.

5.2 The ATFM operational concept establishes a simple implementation strategy. It is recommended that this strategy be developed by stages to maximise available capacity and to allow all stakeholders to acquire sufficient experience.

5.3 The experience acquired by some CAR/SAM States permits the application of basic ATFM procedures at airports, without the immediate need to have a regional ATFM centre, which will require extensive studies to define the operational concepts, system requirements, and institutional aspects for ATFM implementation in the CAR/SAM Regions.

Note: See further details in the Air Traffic Flow Management Operational Concept for the Caribbean/South American Regions (CAR/SAM ATFM CONOPS).

5.4 In summary, ATFM initiatives are initially required only during certain periods of time when aerodromes and ATC sectors experience delays related to demand and capacity issues.

6. ATFM IMPLEMENTATION

6.1 Within this context, as of xx xxx 2010, an Air Traffic Flow Management Unit, called xxx FMU, will be established in the airspace of (..STATE…) in order to offset the fact that air traffic demand sometimes exceeds or is expected to exceed the declared capacity of air traffic control services or airport capacity at a given point in time.

6.2 The FMU will be established in the Air Traffic Control Centre - xxx ACC, with sufficient authority for flow planning, and will have the support of automated ATS and ATFM systems, telecommunications, statistical applications, and any other required infrastructure.

6.3 The FMU, through regional air navigation agreements or, if applicable, through multilateral agreements, will establish the necessary mechanisms of coordination with other regional

agreements. These agreements will take into account common procedures and methods for determining capacity.

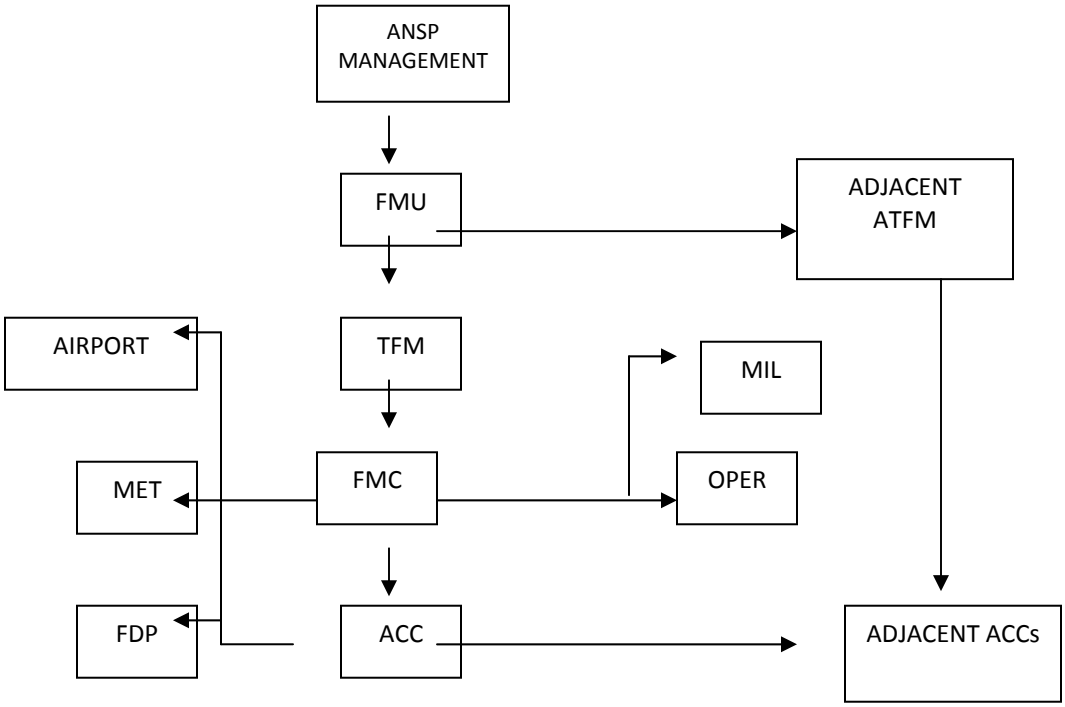
6.4 The procedures governing the provision of ATFM services in the domestic airspace will be determined, as of xx xxx 2010, through an "ATFM service procedural handbook", which will also include a chapter on communication procedures and messages and procedures to coordinate with regional ATFM entities or other ATFM units.

6.5 For purposes of a collaborative decision-making process, the FMU incorporates operators into its planning processes and establishes the need to share information with them as deemed appropriate, including aircraft position information, projections, forecasts, and, in general, everything that contributes to airspace efficiency.

6.6 The ATFM service basically seeks to improve demand-capacity balancing in the most congested airspaces of the country, starting with the international airport(s) of XXXXX and XXXXXX.

7.- GENERAL ORGANISATION AND FUNCTIONS OF THE ATFM SERVICE

7.1 The xxx FMU conducts its activities according to the following flow diagram:



7.2 The FMU performs the following functions:

a) Plan, coordinate, promulgate, and implement ATFM measures within its area of responsibility, taking into account the various planning phases.

b) Assess, declare, and analyse, every xxx (nn) months, ATC capacity with respect to the hourly capacity of the airport, control areas, or control sectors, within its area of responsibility.

c) Provide daily reports and statistics on ATFM operations, delays, and any other information relevant to the ATC and air operators.

d) Provide daily reports and statistics on ATFM operations and delays, for operational and administrative purposes.

e) Receive and process ATFM incident reports.

7.2 FMU UNITS

7.2.1 The xxx FMU is made up by different flow management support positions, namely:

- Air traffic flow supervisor position (TFM)
- Air traffic flow coordinator position (FMC)
- Flight plan processing position (FDP)
- Meteorology position (MET)
- Airline and air operator position (OPER)
- Civil-military coordination position (MIL)
- Technical and operational support position

7.2.2 Each of these positions will be gradually implemented and strengthened according to ATFM service requirements, progress made in coordination activities, and the development of information technology and communication resources.

7.2.3 FMC positions have been established in the FMU to provide the necessary interface among ATFM partners, such as the ATC, air operators, airports, and the FMU, in relation to the provision of the ATFM service in the tactical planning phase.

7.3 OPERATING SCHEDULE

The schedule in which ATFM service (xxx FMU) is to be provided is from 11:00 UTC to 05:00 UTC. Outside of this time period, the supervisor of the xxx ACC fulfils the functions of the xxx FMU.

8 ADDITIONAL INFORMATION

The members of the ATFM community and, in general, any user, may request additional information through the following contacts:

- General Director of Civil Aviation / ANSP

  Mr./Ms. xxxx xxxxxx xxx Telephone xxxxxx e-mail: xxxxxx@xxxxxx.com

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APPENDIX D

METHODOLOGY ADOPTED BY BRAZIL TO CALCULATE THE CONTROL CAPACITY OF ACC OF BRAZILIAN FIR

1.1 As mentioned in SAM/IG/2, DECEA adopts a methodology to determine the capacity of APP and ACC sectors which makes possible to obtain a reference value for the sector's capacity. It consists in obtaining a value, calculated through a mathematical formula, whose basic data are extracted from a research carried out by a group at the ATC unity, considering a moment of heavy activity, when the controller's actions and his availability, at that moment, to control the traffic of the control sector are observed and timed. When an estimated capacity is being successfully applied to the sector at issue, that phase is not necessary.

1.2 CAPACITY INVESTIGATION THROUGH MATHMATICAL FORMULA

1.2.1 The term ATC capacity reflects the capacity of the ATC system or of any of its subsystems, or operational positions, to provide the aircraft the services foreseen within the regular activities of these unities.

1.2.2 In Brazil, the capacity of ACCs is calculated by observing the capacity of their sectors which are analytically obtained, according to the methodology established in the ICA 100-30, ATC personnel planning (DECEA, 2007). In this way, the model used in Brazil can be classified as mesoscopic (where some additional detail is taking into consideration) and analytical (through mathematical formulas).

1.2.3 Nowadays, the calculated value can be understood as the maximum number of aircraft that can be simultaneously controlled by each operational position (ATCO), so providing the capacity carried out by the ATC unity. It is worthy to emphasize that DECEA has been working on new concepts which, in the future, will consider that value as a reference to be adjusted according to operational judgment.

1.2.4 According to the current model, the controller's work load is the summation of the time spent on each of the following tasks:

a) communications (transmission/reception);
b) manual activities (filling out strips) and coordination; and
c) traffic planning and distribution.

1.2.5 The Brazilian methodology applies the concept of the controller's **"availability factor"** (ϕ), which is defined as the percentage of time available for the ATCO to plan the aircraft separation procedures.

1.2.6 This availability factor is found, usually, between a minimum value of 40% of the ATCO time, for no radar control, and 60% for radar (ICA 100-30). Efforts shall be focused on increasing ϕ and the only way to achieve this goal is by applying measures which reduce the controller's engagement with the activities mentioned in 1 and 2.

1.2.7 This factor ϕ can present a bigger percentage when the Man / Machine Interface – MMI is enhanced.

1.2.8 In Brazil, the number of aircraft that can be simultaneously controlled by a controller (N), within the sector at issue, is calculated through the following formula (ICA 100-30):

$$\mathbf{N = \phi \cdot \delta \cdot (\eta \cdot \tau_m \cdot \nu_m)^{-1}} \qquad \mathbf{(1)}$$

1.2.9 In the formula (1), the ATC capacity is inverse or direct function of some factors (ICA 100-30), as follows:

- **Factores directly proportional to the ATC capacity:**
  - ϕ : factor of controller availability, defined as the percentage of time available to plan the aircraft separation procedures;
  - δ : average distance flown by aircraft in the sector, which is function of the pathways and route or terminal established for each sector;

- **Factors inversally proportional to the ATC capacity:**
  - η : number of communication for each aircraft in the sector, which must be restricted to the necessary minimum for the understanding between pilot and controller. That number can be minimized by issuing a full clearance with the necessary anticipation to allow the flight planning;

  - τ_m : average length of time of each message. This factor can be minimized by transmitting messages in an objective way, avoiding long explanations which are detrimental as far as the understanding between pilot and controller is concerned; and
  - ν_m : average speed of the aircraft in the sector.

1.2.10 Replacing δ y νm by the average flight time spend by the aircraft crossing the sector (T), that formula can be replaced by a simpler version:

$$\mathbf{N = \phi \cdot T \cdot (\eta \cdot \tau_m)^{-1}} \qquad \mathbf{(2)}$$

1.2.11 The values of the factors ϕ, T, η and τm are collected empirically, following the standardized procedures.

1.2.12 As an example, we can consider T= 12 minutes, τm = 9 seconds, ϕ = 60%, η= 6, which results in a number of simultaneous aircraft N = 8 per controller in the referred sector. In other words, in this sector and under these conditions, a controller would control 8 aircraft simultaneously.

1.2.13 Several factors are constantly influencing number N. Factors directly related, for instance, sector size or route modification. Thus, every time a significant change is notice, it is necessary an update of the determined value. Besides, it is important that the data gathering be very expressive, in order to dilute the provisional stochastic deviations and to represent trustworthy values to the ATC unity.

1.2.14 In ideal conditions, data research shall be conducted when there is a heavy air traffic activity, for this reason to choose the ideal season is a factor to be considered, once it has a direct influence in final results.

1.3 GENERAL PROCEDURES PERFORMED:

1.3.1 Brazil has calculated the capacities of all sectors, isolated and combined. After performed

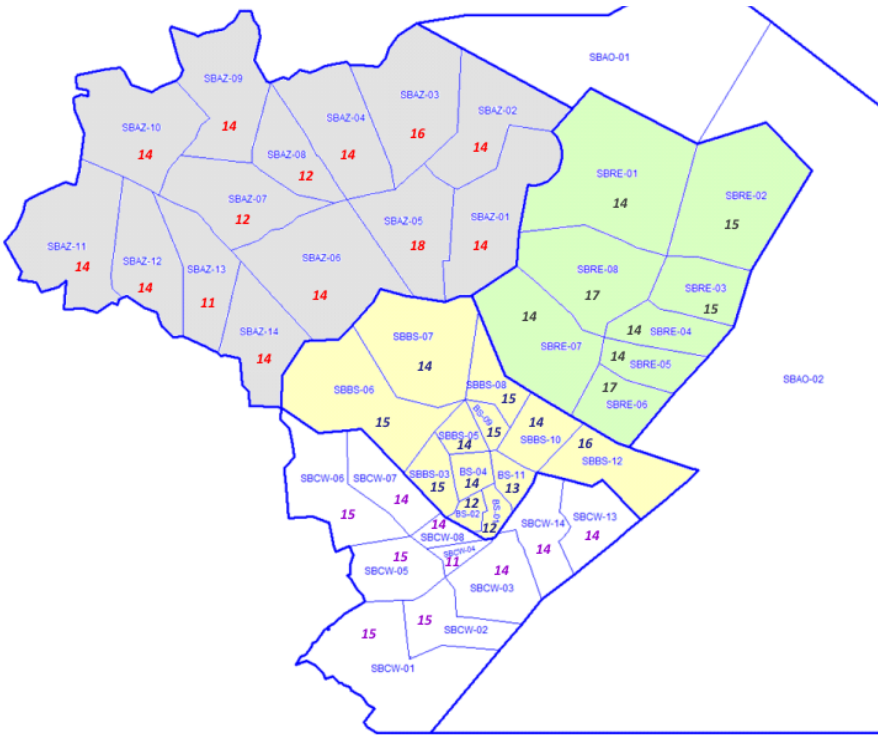
the calculus of sector, considerations are been made taking account an analysis of main trajectories of air traffic flow, also the complexity of each sector and the adjacent sector capacity adjustment.

1.3.2 The factor of controller availability (ϕ) is taking “in loco” in ATC, when air traffic controller is performing its job and it is variable, being it as big as there is assistant to perform its tasks of coordination and fill “strips”. However, in some cases Brazil adopted the minimum availability factor allowed for radar control, 60%, according to the document and this limit was used to the calculus of capacity.

1.3.3 Brazil used to collect all data “in loco” by measuring with chronometer the time spent by ATCO on his duties as communicating with aircrafts on sector. Nowadays, it was used the tapes recording of ATC communication to obtain some parameter of formulae. This provides some advantages since one can rewind the tape to check out some details that was misunderstood.

1.3.4 The obtainment of the samples which were used for the calculations were taken from the recorded tapes on the period from at least a week and it was the minimum to fulfil the statistics requirements.

1.3.5 Due to the characteristics constant of formulae, the aircraft crossing the sector (T) is the strongest factor and it tends to compromise the capacity ranging to values too high, beyond of a comfortable situation to the ATCO’s. For this reason, Brazil, in these cases, considered a maximum of 16 minutes sector as aircraft crossing the sector (T).



The figure 1- shows the capacity of all sectors of Brazilian FIR.

1.3.6 The item 2.3 below shows an example of calculation according to methodology applied.

1.4 CALCULATION OF SECTORS 09 AND 10 COMBINED OF ACC CURITIBA

1.4.1 The sectors 09 and 10 combined is an important sector in the context of Brazilian air traffic flow. It manages all flights that are routed to Galeão international airport coming from North and Northeast, the second most import Brazilian international airport, besides the Santos Dumont a high volume regional airport.

Figure 2- sectors 09 and 10 of ACC Curitiba.

1.5 PROCEDURES PERFORMED

1.5.1 The calculus of sectors 09 and 10 took in consideration the ICA 100-30, ATC Personnel Planning, issued on January 17, 2008 and also the report 11/CGNA/2009, issued on August 28, 2009. The first instructs how to execute the research and collect data above mentioned and the last orients about the statistics parameters of samples.

1.5.2 According to this document the minimum availability factor for radar control is 60% and this limit was used in the case to the calculus of capacity.

1.5.3 The obtainment of the samples which were used for the calculations were taken from the recorded tapes on the period from May 25 until May 29, from 22:58 until 23:25 UTC.

1.5.4 When evaluating the sectors capacity, Brazil looks for consider the consistency respect to overall statistic patterns.

1.5.5 The definition of the air traffic controllers' quantity, the minimum number of aircraft (contacts) is described on the report n. 11/CGNA/2009, on August 28, 2009, appendix A. On this report, the minimum number of air traffic controllers that were taken into account was 09 air traffic controllers and the minimum number of observations for the average time of communication (τ_m) was 30 observations for each air traffic controller and for the average number of communication (η) was 39 observations for each air traffic controller.

1.5.6 The average length of time of each message was 14,5 seconds, as a result of the average of the medium values provided on appendix B.

APPENDIX B

OBSERVED SECTOR	09/10 CWACC	DATE : 25 MAY 2009
OBSERVED ATCO	ATCO 1	

AVERAGE TIME OF COMMMUNICATION IN THE SECTOR

TIME TRA/REC(s) ACFT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
TAM8002									20								16																						2
TAM3827				8																																			1
TAM3505					8																							4											2
GLO1604						14	15																																2
SAA223		23																																					1
TAM3752																6																							1
GLO1577												6																											1
WEB6796	4		8																																				2
GLO1844								14																															1
TAM3135										23	24								22																				3
TAM3152													15																										1
ARG1256														29							28																		2
N3PG															17														10										2
PPARG																		29							11														2
TAM3897																								13															1
GLO1735																					10						7												2
GLO1588																						9																	1
GLO1893																								18															1
GLO1601																												43											1
GLO1819																													24										1

AVERAGE TIME OF COMMMUNICATION FOR EACH AIRCRAFT 15,6

Table 1- example of partial average length of time of each message for each aircraft(τ_m)

1.5.7 The average number of communications of each aircraft in the sector was 02 communications, as a result of the average of the medium values provided on appendix C.

APPENDIX C

DATE :	25/26/27/28/29 MAY 2009
OBSERVED SECTOR	SECT. 9/10
OBSERVATION TIME	

LENGTH OF TIME OF EACH COMMMUNICATION OF THE AIRCRAFT (TRANS./RECEP.)sec

n

AIRCRAFT	AIR TRAFFIC CONTROLLER														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	2	4	2	2	3	2	3	3	1							
2	1	1	2	3	4	4	6	2	3							
3	2	6	1	5	1	4	5	2	4							
4	2	1	1	2	1	3	2	3	3							
5	1	1	2	5	1	1	3	2	1							
6	1	2	2	4	1	1	2	4	2							
7	1	2	2	4	6	1	1	4	2							
8	2	1	3	1	2	2	1	1	1							
9	1	1	5	1	2	1	1	1	2							
10	3	1	1	1	3	3	1	2	3							
11	1	1	1	1	3	2	1	1	3							
12	2	2	1	1	2	1	1	2	1							
13	2	2	1		1	1	2	1	1							
14	2	3	2			1	1	1	1							
15	1	2	2			2		1	1							
16	2	1	1			1			1							
17	1		1													
18	1															
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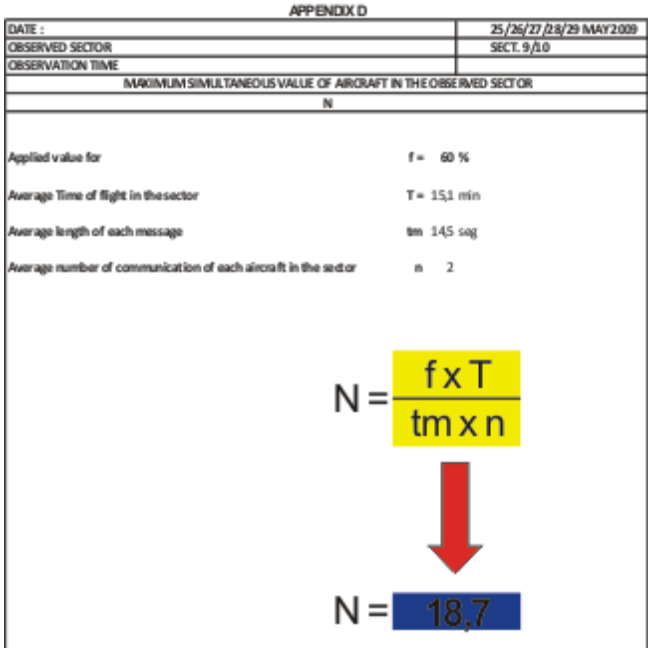
28																
29																
30																
ARITHMETIC MEAN BY ATCO	1,5	1,9	1,8	2,5	2,3	1,9	2,1	2,0	1,9							
THE AVERAGE NUMBER OF COMMMUNICATION WITH EACH AIRCRAFT IN THE SECTOR	2,0															

Table 2- example of average number of communication for each aircraft (η)

1.5.8 The time of permanence in the sector was the result of the harmonic medium of the flights that circulate in 09 and 10 sectors, extracted from SYNCROMAX, tool used to manage ATFM data, and the value for the mentioned situation was 15,1min.

1.5.9 Appendix D represents the formula of ICA 100-30 and the calculation of the capacity for the 09/10 sectors when joined.



APPENDIX D

DATE :	25/26/27/28/29 MAY 2009
OBSERVED SECTOR	SECT. 9/10
OBSERVATION TIME	

MAXIMUM SIMULTANEOUS VALUE OF AIRCRAFT IN THE OBSERVED SECTOR

N

Applied value for	f = 60 %
Average Time of flight in the sector	T = 15,1 min
Average length of each message	tm 145 seg
Average number of communication of each aircraft in the sector	n 2

$$N = \frac{f \times T}{tm \times n}$$

$$N = 18,7$$

1.5.10 Brazil adopts 80% of the ATC capacity found in the calculations, rounding it up in order to make possible a minor probability of causing delays in case of situations which may occur a demand peak. In this way, the value that must be updated in the operations manual of the ATC unity and also used when controlling is 16 simultaneous aircraft, with a possibility of reaching 19 simultaneous aircraft for a short period of time.

1.5.11 The table 4 pictures the capacities of all sector of Brazilian FIR, isolated and combined.

Agenda Item 6: Assessment of operational requirements in order to determine the implementation of communications and surveillance (CNS) capabilities improvement for en-route and terminal area operations

AMHS Interconnection

6.1 As follow-up to the action plan for AMHS interconnection, the Meeting took note of the information provided by Argentina, Brazil, Chile, Paraguay and Peru, with regard to the progress made on AMHS interconnection in the SAM Region.

6.2 With regard to the implementation tasks for AMHS interconnection specified in the Memoranda of Understanding (MoU) between Argentina–Paraguay, Argentina-Brazil, Brazil-Paraguay and Colombia-Peru, the following is informed:

6.3 In all cases, the communications means was the REDDIG, assigning an IPv4 address for the link, in accordance with Conclusion CNS/ATM/1-6 of the first meeting of the CNS/ATM Subgroup CNS/ATM (Lima, Peru, 15-19 March 2010).

6.4 To complete the message exchange tests, the specifications in the Guide for the operational interconnection of AMHS in the SAM Region will be used, which is based on the interconnection trials specified in the EUR AMHS Manual, Appendix E.

Argentina–Paraguay

6.5 Network transportation and connectivity tests were completed, and partial message exchange testings between the Ezeiza and Asuncion MTAs were started, pending completion the message testings indicated in para. 6.4.

6.6 Since the date to complete the exchange tests and start of operation have been modified many times, the Meeting urged the aeronautical administrations involved to carry out all coordinations necessary to finish the tests and operational connection no later than the end of December 2010.

6.7 The Meeting analyzed the causes for the delays, determining that the States depended on the provider (as the latter was unavailable, installing other systems at other States) and that its own personnel was not in the capacity to carry out the interconnection tasks. The delegate of Paraguay informed that the provider of its AMHS would be travelling to Asuncion at the end of October 2010, with the aim of completing the message testing.

Argentina-Brazil

6.8 The network transportation and connectivity tests and the stress tests between the Ezeiza (CIPE) and Manaos MTAs have been completed (the results have been included in the Study for the implementation of the SAM ATN), pending the completion of the trials indicated in paragraph 6.4 between the Ezeiza and Brasilia MTAs. Once this test is completed, the procedures for the operational interconnection will be determined. Be then, Argentina will require the assistance of its provider.

6.9 Since the date to complete that exchange tests and the start of operation have also been many times modified, the Meeting urged the aeronautical administrations involved to make all coordinations necessary with the aim of completing the tests and the operational connection no later than the end of December 2010.

Brazil-Paraguay

6.10 As to this interconnection, the programming of the REDDIG circuit has not taken place, neither the network transportation and connectivity tests, nor the message exchange tests between the Asuncion and Brasilia MTAs.

6.11 Taking into account the delay in the dates for the trials and start of operation scheduled in the MoU signed between the administrations of Brazil and Paraguay, both were urged to complete the activities programmed before 31 December 2010.

Colombia-Peru

6.12 The Meeting noted that on June 2010 Colombia and Peru had signed the MoU for the interconnection of the Bogota and Lima MTAs.

6.13 Network transportation and connectivity trials and partial message exchange testings between the MTAs were conducted, while the operational interconnection between the both MTAs has been scheduled for November 2010.

6.14 The delegate of Peru informed that, to carry out the interconnection, it required the support of the manufacturer. In this respect, the aeronautical administrations of Colombia and Peru were urged to carry out all previous coordinations with the aim that the interconnection is operational on the scheduled date.

Establishment of new MoU

6.15 In follow-up to Conclusion SAM IG/4-10 and the activities described in the regional action plan for the interconnection of AMHS, the Meeting took note that:

Argentina-Chile (Ezeiza and Santiago MTAs)

6.16 Once reviewed, the delegate of Argentina signed the MoU; Chile indicated it would sign it on the week of 26 October, and would send the signed MoU to Argentina, and the ICAO SAM Regional Office. The operational interconnection is scheduled for April 2011.

Argentina-Peru (Ezeiza and Lima MTAs)

6.17 Once reviewed, the delegate of Argentina signed the MoU; Peru indicated it would sign it on the week of 26 October, and would send the signed MoU to Argentina. The operational interconnection is scheduled for June 2011.

Brazil-Colombia

6.18 The delegation of Brazil presented a draft MoU to be sent to the Colombian administration. Same indicates April 2011 as date of operation of the application.

Brazil-Peru (Santiago and Lima MTAs)

6.19 Once reviewed, the delegate of Brazil signed the MoU; Peru indicated it would sign it on the week of 26 October, and would send the signed MoU to Brazil. The operational interconnection is scheduled for June 2011.

Chile-Peru (Santiago and Lima TMAs)

6.20 The MoU will be drafted shortly.

6.21 Since during the Meeting the delegations of Colombia, Panamá and Venezuela presented no information with regard to respective MoUs and that, in addition, the delegation counted with no personnel able to draft the MoU with the corresponding counterparts, the MoUs foreseen for this Meeting were not obtained.

Actions required for AMHS interconnection

6.22 The Meeting, taking in consideration the delay in the implementation of the drafted MoUs (some of them drafted in 2009), mostly due to the great dependence some States have with their respective providers for the task, urged States to require from their providers the support necessary to successfully end the necessary interconnections; make necessary arrangements to train personnel in the interconnection tasks, with the aim of minimizing the dependency with their providers; and maximize pertinent coordinations.

6.23 In this respect, the Meeting formulated the following Conclusion:

Conclusion SAM/IG/6-9 - Actions required for AMHS interconnection

That SAM States, in view of the delays in the interconnection of the AMHS, proceed with the following actions:

a) Require from their AMHS providers the necessary support to successfully end the necessary interconnections;
b) Make necessary arrangements to train personnel in the interconnection tasks, with the aim of minimizing the dependency with their providers;
c) Maximize pertinent coordinations; and
d) States that have not yet done so, complete the drafting and signature of the MoU.

6.24 The Meeting, as follow-up to the activities for the interconnection of the AMHS described under this Agenda Item, examined the action plan for the interconnection of AMHS systems in the SAM Region shown in **Appendix A**.

Study for the implementation of an ATN network for the SAM Region

6.25 The Meeting took note of the work presented for the implementation of an ATN network for the SAM Region, which proposes a mixed configuration (satellite + ground) as the most appropriate backbone for this network, which brought about a long debate which concluded that, even though a first analysis makes that the proposed option seem the most convenient, the following actions be established:

a) That the Study be circulated to States for comments by 31 January 2011;

b) Request the Fourth Coordination Committee Meeting (RCC/4) of RLA/06/901 project to approve the holding of a "seminar/workshop on new satellite and ground network technology", where providers and service integrators can expose the various available technological solutions, but delimited within the basic guidelines required. Same would be carried out from 14 to 16 March 2011;

c) That during the Fourteenth Coordination Committee Meeting (RCC/14) of REDDIG, to be held in Lima from 17 to 18 March 2010, the final configuration to be adopted be established; and

d) Request the fourth coordination committee meeting of RLA/06/901 project to approve the requirement for a communications expert for a 15-day period to elaborate a technical specifications document for the implementation of a SAM ATN network.

6.26 In this respect, the Meeting formulated the following Conclusion:

Conclusion SAM/IG/6-10 - Review to the study for a new SAM digital network

That SAM States analyze the study for the implementation of a new digital network for the SAM Region shown in **Appendix B** to this part of the Report, and send their comments to the ICAO SAM Regional Office by 31 January 2011.

6.27 **Appendix C** presents the revised action plan on the study for the implementaion of a new digital network for the SAM Region.

Study on the line of sight coverage for communications, navigation and surveillance systems

6.28 The Meeting, upon analyzing the proposal to purchase a software tool to complete the line of sight diagrammes for VOR/DME navigation, communications and surveillance systems, took under consideration the offer of Brazil that, instead of purchasing the software tool, a one-week workshop on coverage analysis and DME/DME verification studies to support the application of PBN RNAV 5 be conducted. The Meeting deemed it convenient that the event take place in Lima, Peru, tentatively from 21 to 25 March 2011. In addition, with the aim of completing the DME/DME coverage for the whole the SAM Region, the Meeting took under consideration the hiring of an expert for a 15-day period.

Seminar on ground and flight testing for the new navigation and surveillance systems

6.29 The Meeting, upon analyzing the Secretariat's proposal to conduct a seminar on ground and flight testing for the new navigation and surveillance systems, took under consideration the offer of Brazil to host this event. The seminar would be tentatively dictated from 21 to 23 November 2011.

6.30 The seminar, in principle, would have the following objective:

a) Evaluate the current situation of the flight testing units in the Region, with regard to their capability to carry out flight and ground testings necessary for PBN applications, as well as the new navigation and surveillance systems;

b) Become aware of the activities scheduled by ICAO for the drafting of guidance documentation or amendments with regard to ground and flight testings in the navigation and surveillance systems;

c) Inform on the new ground and flight instrument equipment, techniques and evaluation trends;

d) Become aware of the experience in the implementation of PBN flight tests and new surveillance systems in other ICAO regions; and

e) Establish recommendations in order that the existing flight testing units count with the necessary equipment and training for the flight and ground evaluation of PBN applications, as well as of the new navigation and surveillance systems.

SAM Region Performance-Based Air Navigation Planning

6.31 The Meeting reviewed the SAM Region Performance-Based Air Navigation Planning presented in IP/7, en the parts pertaining to the CNS area.

APPENDIX A

ACTION PLAN FOR THE INTERCONNECTION OF AMHS SYSTEMS IN THE SAM REGION

ITEM	ACTIVITY	RESPONSIBLE	EXPECTED RESULT	STATUS	FINALIZATION DATE
1	2	3	4	5	6
1	Review of the ATN Regional Plan as regards AMHS implementation	Secretariat	Revised ATN ground ground applications plan (Table CNS 1Bb)	Completed	Jun 2009
2	Review and assignment of intra-regional routers IP addressing	Secretariat	Assignment of IP addressing	Completed	Jun 2009
3	Review of CAAAS addressing plan	SAM States	Revised CAAS addressing Plan	Completed	Jun 2009
4	Prepare interconnection protocol tests to determine bandwidth required for transmission of AMHS messages between MTAs through REDDIG	RLA/06/901 project CNS Expert	Protocol interconnection tests. A guide for the operational interconnection of AMHS systems was drafted	Completed	Dec 2009
5	Preparation of Guide for the Operational Interconnection of AMHS Systems in the SAM Region	RLA/06/901 project CNS Expert	Guide for the operational interconnection of AMHS systems in the SAM Region	Completed	Oct 2009
6	Drafting of a model MoU for the interconnection of AMHS	Argentina	Model MoU for the interconnection of AMHS	Completed	Oct 2009
7	MoU for the interconnection of AMHS currently implemented in the SAM Region: a) Argentina-Brazil b) Argentina-Chile c) Argentina-Peru d) Argentina-Paraguay e) Brazil-Colombia f) Brazil-Paraguay g) Brazil-Peru h) Chile-Peru i) Colombia-Perú j) Colombia-Panama	SAM States involved	MoU for interconnection of AMHS systems between SAM States having AMHS implemented.	Valid a), d), f) & i) Completed	b) Oct 2010 c) Oct 2010 g) Oct 2010 e) Jan 2011 h) Dec 2010 j) May 2011
8	Phase I Interconnection trials between MTAs of: a) Argentina-Brazil b) Argentina-Paraguay c) Brazil-Paraguay d) Colombia-Peru Types of tests to carry out: Network transportation; Network connectivity; Message exchange; Preparatory phase.	Argentina, Brazil, Paraguay and REDDIG Administration	Interconnection trials between Argentina, Brazil and Paraguay MTAs	Valid a) network transportation and connectivity trials carried out with the Manaos node. MoU was updated, since Brazilian entrance node will be Curitiba. Network connectivity, and transport and exchange of messages tests will be repeated b) network transportation and connectivity, and message exchanges trials carried out. c) MoU was updated, as entrance node to Brazil will be Curitiba, and the network connectivity, and transport and exchange of messages tests will be carried out.	a) Dec 2010 b) Dec 2010 c) Dec 2010 d) Nov 2010

ITEM	ACTIVITY	RESPONSIBLE	EXPECTED RESULT	STATUS	FINALIZATION DATE
1	2	3	4	5	6
9	Phase II Interconnection trials between MTAs of: a) Argentina-Chile b) Argentina-Peru c) Brazil-Colombia d) Brazil-Peru e) Chile-Peru f) Colombia-Peru g) Panama-Colombia Types of tests: Network transportation; Network connectivity; Message exchange; Preparatory phase.	Argentina, Brazil, Chile, Colombia, Panama y Perú	Interconnection trials between AMHS systems listed in column 2 of this table.	Valid a) Network transportation tests carried out b) Network transportation and connectivity tests carried out. Draft MoU was presented. c) Network transportation and connectivity tests carried out. Draft MoU was presented. d) Network transportation and connectivity tests carried out. Draft MoU was presented. e) No tests were carried out. f) Network transportation and connectivity tests carried out as per EUR AMHS Manual, Appendix E. g) No tests were carried out.	a) May 2011 b) May 2011 c) Apr 2011 d) Apr 2011 e) Apr 2011 g) TBD
10	Operational interconnection implementation at the following MTAs: a) Argentina-Paraguay b) Argentina-Brazil c) Argentina-Chile d) Argentina-Peru e) Brazil-Colombia f) Brazil-Paraguay g) Brazil-Peru h) Chile-Peru i) Colombia-Peru j) Panama-Colombia	Argentina, Brazil, Chile, Colombia, Panama, Paraguay and Peru	Operational implementation of AMHS systems.	a) In accordance with MoU b) In accordance with MoU d) In accordance with MoU f) In accordance with MoU g) In accordance with MoU	a) Dec 2010 b) Dec 2010 c) Jun 2011 d) Jun 2011 e) Apr 2011 f) Dec 2010 g) Jun 2011 h) Apr 2011 i) Nov 2010 j) TBD

APPENDIX B

AERONAUTICAL TELECOMMUNICATION NETWORK OF THE SAM REGION (SAM ATN)

STUDY FOR THE IMPLEMENTATION OF A NEW DIGITAL NETWORK IN THE SAM REGION

SAM ATN NETWORK

(REDDIG II)

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REFERENCES

- Final Report of the Fifth Workshop/Meeting of the SAM Implementation Group (SAM/IG/5), Lima, 10-14 May 2010;
- RCC/13 report – Financial Status of Project RLA/03/901;
- Air Navigation Plan for the Caribbean and South American Regions – FASID – Tables CNS1A and CNS1C;
- Table CNS 1Ba – Regional Plan for Routers / SAM Region;
- REDDIG Channelling Plan, V. June 2010, provided by the REDDIG Administrator;
- Manaus AMHS documents – Ezeiza tests;
- Ezeiza AMHS documents – Ezeiza tests;
- Informal quote of *Telefónica SA* for a South American ground network;
- Informal quote of *Empresa Brazileira de Telecomunicaciones* (EMBRATEL) for a South American ground network;
- Informal quote of *Global Crossing Latin America* for a South American ground network;
- Telesat quotes for Brazil; and
- SES quote for the MEVA II – REDDIG interconnection.

GLOSSARY OF TERMS

- ATN Aeronautical Telecommunication Network
- FOB Free on Board, as defined in the INCOTERMS (International Commercial Terms) and published by the ICC (International Chamber of Commerce)
- ISO International Organization for Standardization
- MPLS Multiprotocol Label Switching
- OPEX Operating Expenditure
- OSI Open System Interconnection
- RFC Request for Comments
- SLA Service Level Agreement
- QoS Quality of Service
- VPN Virtual Private Network

INTRODUCTION

1. The Fifth Workshop/Meeting of the SAM Implementation Group (SAM/IG/5), held in Lima on 10-14 May 2010 and sponsored by Regional Project RLA/06/901, considered the conduction of studies on the implementation of a new regional satellite, ground, or mixed (satellite and ground) digital network to serve as the backbone for the SAM Aeronautical Telecommunication Network (SAM ATN), which shall support the current aeronautical fixed voice and data requirements, the exchange of radar and flight plan data, as well as the new ground-ground ATN applications between SAM States/Territories, foreseen to be implemented in the short and medium term.

2. In this regard, *Appendix B to the Report on Agenda Item 6* of the cited workshop clearly describes the Action plan for the implementation of a new digital network in the SAM Region, listing a programme of activities, actions and deliverables.

3. In this regard, the deliverables corresponding to activities 1 to 10, inclusive, are organised according to the following structure:

3.1 *Chapter 1*: Service requirements in support of air navigation in the SAM Region, including those foreseen for the short, medium and long term.

3.2 *Chapter 2*: Interfaces and bandwidth required to support the specified requirements.

3.3 *Chapter 3*: Definition and cost of a satellite REDDIG II structure model.

3.4 *Chapter 4*: Definition and cost of a ground REDDIG II structure model.

3.5 *Chapter 5*: Comparative study of the REDDIG II satellite and ground models and costs.

3.6 *Chapter 6*: Analysis of the mixed model and proposal of a final infrastructure.

4. First of all, some clarifications regarding the *SAM Aeronautical Telecommunication Network (SAM ATN)* are in order to define the work to be carried out subsequently.

5. The SAM ATN will be based on IP. Thus, its core structure will be made up by routers linking the domestic services (either current or future) to the backbone access; that is, to the new digital network.

6. So as not to have a common point of failure, each State will have a dual router. Thus, the basic operating scheme will be that shown at the end of this chapter, in Figure 1.

7. There we can see that, regardless of the technology available in each State, all services are connected to the routers, either directly or through the existing LAN.

8. Some possible options are listed below:

8.1 ATS speech service or teleconference, without PABX or VCS, with the telephone connected directly to the router.

8.2 ATS speech service or teleconference, with PABX or VCS, with interfaces connected directly to the router.

8.3 ATS speech service or teleconference, with PABX or VCS, connected to the LAN.

8.4 AFTN service, with the terminal connected to the corresponding router interface.

8.5 AFTN/AMHS service, with servers and terminals connected to the LAN.

8.6 Automated systems and their terminals, connected to the LAN.

9. Finally, it should be noted that, in order to distinguish the current digital network (REDDIG) from the new digital network, the latter will hereinafter be called as REDDIG II, without this meaning that this should be its definitive name in the future.

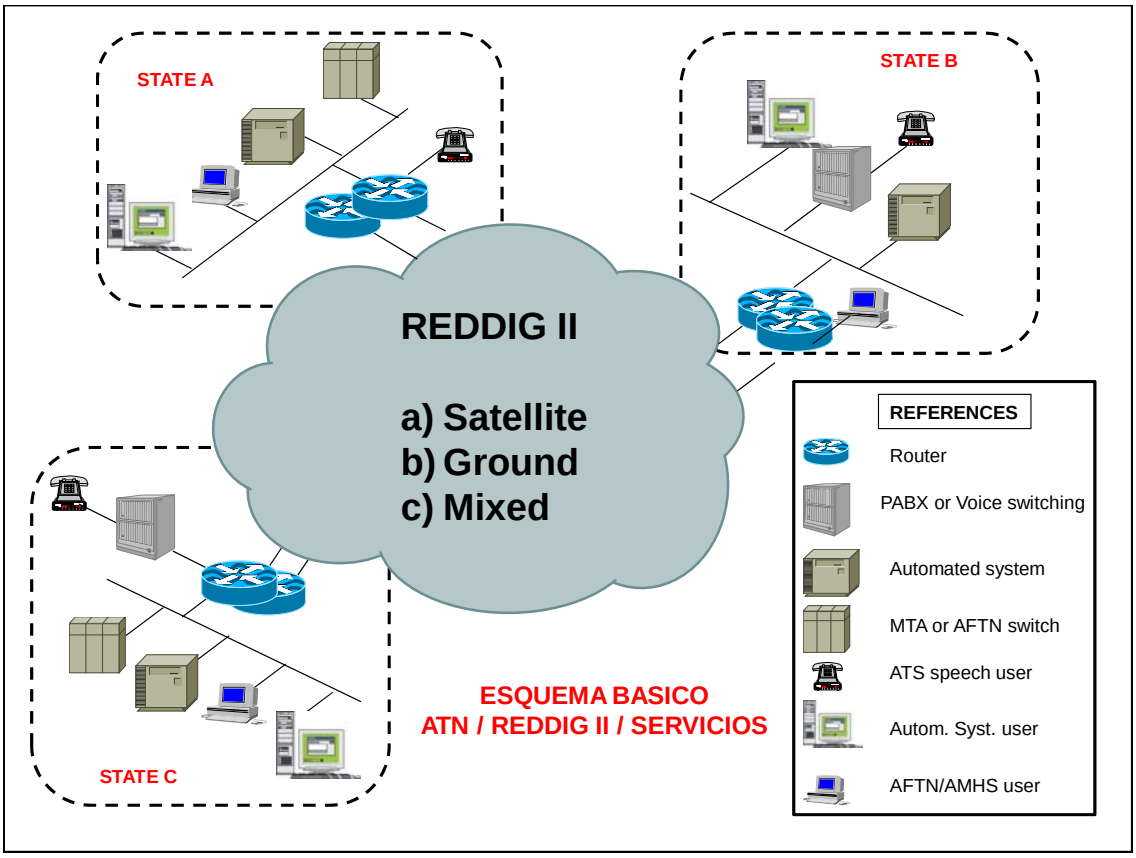

Figure 1: Basic ATN-REDDIG II--Service scheme

Chapter 1 - Service Requirements to Support Air Navigation in the SAM Region, Including those foreseen for the Short, Medium and Long Term

1. The list of services in support of air navigation in the SAM Region, including those foreseen for the short, medium and long term, to be carried by the new digital network include:

1.1 Current services:

1.1.1 Those resulting from the requirements contained in the Air Navigation Plan for the Caribbean and South American Regions, and which are almost fully operational to date, namely:

1.1.1.1 Table CNS1A (AFTN Plan)

1.1.1.2 Table CNS1C (ATS direct speech circuit plan)

1.2 Future services:

1.2.1 Those emerging from the MEVA II – REDDIG interconnection.

1.2.2 The teleconference service for flow management units (FMU) or flow management positions (FMP) to be provided on a daily basis between all units in the Region, initially for twenty users.

1.2.3 The exchange of flight plans and/or radar information, using conventional methods, according to the respective MoUs (Memoranda of Understanding) already signed or to be signed.

1.2.4 AMHS interconnection requirements, gradually replacing the AFTN service, according to the respective MoUs signed or to be signed.

1.2.5 AIDC interconnection requirements, gradually replacing the ATS speech service.

1.2.6 ADS-B data exchange and multilateration between all the ACCs of adjacent FIRs.

1.2.7 The interconnection of automated systems, using Asterix 62 and 63, of all the ACCs of adjacent FIRs.

1.2.8 AIM requirements: to date, there are no concrete requirements.

Chapter 2 – Interfaces and Bandwidths Required to Support the Specified Requirements

1. This Chapter and its Appendices analyse in detail the various services to be maintained (current) or provided (future) by the ATN, which determines the minimum *interfaces* that the routers to be installed in each State should have.

2. The existing interfaces that are needed to maintain the MEVA II – REDDIG integration have been included in the respective tables.

3. On the other hand, the interfaces of services that correspond to the AFI (Brasilia – Johannesburg, Brasilia – Dakar – both *via* Recife – and Ezeiza – Johannesburg), EUR (Recife – Canary Islands, Venezuela – Madrid, Ezeiza - Canary Islands) and ASIA/PAC (Santiago - Brisbane and Santiago - Christchurch) Regions have been excluded since they use PTT or CAFSAT, and therefore are not related to the problems being addressed.

4. Likewise, an estimate is made of the additional *bandwidth* that will be required from the REDDIG II for the new services, based on the tests conducted and other specified parameters.

5. At the end of this chapter, the following appendices are included:

5.1 *Appendix A*: Interfaces and additional bandwidth for the AFTN.

5.2 *Appendix B*: ATS speech interfaces and additional bandwidth.

5.3 *Appendix C*: Interfaces and additional bandwidth for radar data exchange.

5.4 *Appendix D*: Interfaces and additional bandwidth for teleconferencing.

5.5 *Appendix E*: Interfaces and additional bandwidth for AMHS.

5.6 *Appendix F*: Interfaces and additional bandwidth for AIDC.

5.7 *Appendix G: Interfaces and additional bandwidth for the exchange between automated systems.*

5.8 *Appendix H: Interfaces and additional bandwidth for ADS-B.*

5.9 *Appendix I*: Modification of Table CNS 1Ba – Regional Routers Plan / SAM Region.

6. **Summary of results**

6.1 Based on the individual summaries provided in each of the aforementioned appendices, Tables 2-1 (Interfaces required for routers) and 2-2 (Approximate additional bandwidth) are shown below:

6.1.1 Interfaces

State	Location	Minimum interfaces					
		Universal I/O	**Ethernet**	**Digital**	**E&M**	**FXO**	**FXS**
Argentina	Ezeiza	11	1	0	11	0	1
Bolivia	La Paz	4	1	0	4	0	4
Brazil	Curitiba	4	1	0	6	2	1
	Manaus	6	1	0	7	0	5
	Recife	1	1	0	7	0	1
Chile	Santiago	2	1	0	8	0	0
Colombia	Bogota	7	1	1	0	0	0
Ecuador	Guayaquil	3	1	1	0	0	0
French Guiana	Rochambeau	2	1	0	0	0	5
Guyana	Georgetown	4	1	0	0	0	5
Paraguay	Asunción	3	1	0	3	0	3
Peru	Lima	9	1	1	0	0	0
Suriname	Paramaribo	3	1	0	0	0	4
Trinidad and Tobago	Piarco	2	1	0	0	0	6
Uruguay	Montevideo	2	1	0	0	4	5
Venezuela	Maiquetía	10	1	0	7	0	4

Table 2-1: Interfaces required for routers

6.1.1.1 This table may be modified only if:

a) Any of the Administrations decides to change analogue voice interfaces for digital ones.
b) If the foreseen exchange of radar signals is conducted through Universal I/O (DB25) instead of Ethernet (RJ45).

6.1.2 Additional bandwidth

6.1.2.1 The rules for the preceding calculation are presented in the respective appendices and from their application it may be assumed that the estimate must be used only as guidance.

6.1.2.2 However, it should be noted that what is not used in the AFTN shall be deducted from the cited increases, since the service is either AFTN or AMHS, never in parallel.

6.1.2.3 Therefore, the value obtained from Table 2A-1 is inserted in the final lines of Table 2-2, providing the net value of the required increase in bandwidth.

State	Location	Service (each in Kbps)			
		AFTN	**Radar**	**AMHS**	**ADS-B**
Argentina	Ezeiza		76.8	28.8	19.2
Bolivia	La Paz		115.2	14.4	19.2
Brazil	Curitiba		76.8	19.2	19.2
	Manaus	9.6	134.4	33.6	19.2
	Recife		0	4.8	19.2
Chile	Santiago		57.6	9.6	19.2
Colombia	Bogota	19.2	76.8	38.4	19.2
Ecuador	Guayaquil		38.4	14.4	19.2
French Guiana	Rochambeau		38.4	9.6	19.2
Guyana	Georgetown		57.6	19.2	19.2
Paraguay	Asunción		57.6	9.6	19.2
Peru	Lima	9.6	96	43.2	19.2
Suriname	Paramaribo		76.8	14.4	19.2
Trinidad and Tobago	Piarco		19.2	9.6	19.2
Uruguay	Montevideo		19.2	9.6	19.2
Venezuela	Maiquetía		76.8	38.4	19.2
Partials (Kbps)		38.4	1017.6	316.8	307.2
Overall partial (Kbps)		1680			
AFTN difference		-103.2			
Net bandwidth increase		**1576.8**			

Table 2-2: Estimated additional bandwidth

6.1.2.4 Estimated additional bandwidth for the REDDIG II: 1.576.8 Kbps.

Appendix 2A: Required interfaces and additional bandwidth – AFTN

1. In order to determine the **interfaces** required for the routers, Table 2A-1 shows the AFTN circuits of the SAM Region and of Trinidad and Tobago, member of the REDDIG. Individual values of each circuit have been taken from the parameters established in the REDDIG management.

AFTN TABLE			Rate (Kbps)	Installed interfaces
Argentina	Ezeiza	Bolivia (La Paz) MET	1.2	9
		Paraguay (Asunción) MET	2.4	
		Peru (Lima) MET	1.2	
		Bolivia (La Paz)	2.4	
		Chile (Santiago)	2.4	
		Brazil (Curitiba)	2.4	
		Paraguay (Asunción)	2.4	
		Peru (Lima)	2.4	
		Uruguay (Montevideo)	2.4	
Bolivia	La Paz	Argentina (Ezeiza)	2.4	4
		Argentina (Ezeiza) MET	1.2	
		Brazil (Curitiba)	2.4	
		Peru (Lima)	2.4	
Brazil	Curitiba	Argentina (Ezeiza)	2.4	4
		Uruguay (Montevideo)	2.4	
		Paraguay (Asunción)	2.4	
		Bolivia (La Paz)	2.4	
	Manaus	Colombia (Bogota)	2.4	6
		Colombia (Bogota) - USA	9.6	
		Guyana (Georgetown)	2.4	
		French Guiana (Cayenne)	2.4	
		Peru (Lima)	2.4	
		Suriname (Paramaribo)	2.4	
	Recife	Venezuela (Maiquetía)	2.4	1
Chile	Santiago	Argentina (Ezeiza)	2.4	2
		Peru (Lima)	2.4	
Colombia	Bogota	Ecuador (Guayaquil)	2.4	7
		Brazil (Manaus) - USA	9.6	
		Brazil (Manaus)	2.4	
		Peru (Lima)	9.6	
		Peru (Lima) - USA	2.4	
		Venezuela (Caracas)	2.4	
		Panama (Panama)	2.4	
Ecuador	Guayaquil	Colombia (Bogota)	2.4	3
		Peru (Lima)	2.4	
		Venezuela (Maiquetía)	2.4	

AFTN TABLE			Rate (Kbps)	Installed interfaces
French Guiana	Cayenne	Venezuela (Maiquetía)	2.4	2
		Brazil (Manaus)	2.4	
Guyana	Georgetown	Brazil (Manaus)	2.4	4
		Suriname (Paramaribo)	2.4	
		Trinidad and Tobago (Piarco)	2.4	
		Venezuela (Caracas)	2.4	
Panama	Panama	Colombia (Bogota)	2.4	1
Paraguay	Asunción	Argentina (Ezeiza)	2.4	3
		Argentina (Ezeiza) MET	2.4	
		Brazil (Curitiba)	2.4	
Peru	Lima	Venezuela (Maiquetía)	2.4	9
		Argentina (Ezeiza)	2.4	
		Argentina (Ezeiza) MET	1.2	
		Bolivia (La Paz)	2.4	
		Brazil (Manaus)	2.4	
		Chile (Santiago)	2.4	
		Colombia (Bogota) - USA	9.6	
		Colombia (Bogota)	2.4	
		Ecuador (Guayaquil	2.4	
Suriname	Paramaribo	Brazil (Manaus)	2.4	3
		Venezuela (Maiquetía)	2.4	
		Guyana (Georgetown)	2.4	
Trinidad and Tobago	Piarco	Venezuela (Maiquetía)	2.4	2
		Guyana (Georgetown)	2.4	
Uruguay	Montevideo	Argentina (Ezeiza)	2.4	2
		Brazil (Brasilia)	2.4	
Venezuela	Maiquetía	Peru (Lima)	2.4	10
		Ecuador (Guayaquil)	2.4	
		Brazil (Recife)	2.4	
		Colombia (Bogota)	2.4	
		Guyana (Georgetown)	2.4	
		Suriname (Paramaribo)	2.4	
		French Guiana (Cayenne)	2.4	
		Curaçao ACC	2.4	
		San Juan ACC	2.4	
		Trinidad and Tobago (Piarco)	2.4	
Current AFTN bandwidth			103.2	

Table 2A-1: AFTN Interfaces

2. Bandwidth: The only two additional requirements of 9.6 Kbps each, with final destination in Atlanta (USA), both *via* Colombia (Bogota), with end points in Brazil (Manaus) and Peru (Lima) have been highlighted in colour. Accordingly, the additional AFTN bandwidth is: 38.4 Kbps.

Appendix 2B: Required interfaces and additional bandwidth - Speech ATS

1. In order to determine the **interfaces** required for the routers, Table 2B-1 shows the ATS speech service requirements of the SAM Region and of Trinidad and Tobago, member of the REDDIG.

2. Likewise, for a better understanding, Table CNS1C (direct and switched) shows both the foreseen circuits as well as those effectively installed in the REDDIG.

ATS TABLE			ATS Req. CNS1C			REDDIG		Installed voice interfaces			
			Direct	Switched		Direct	Switch	Digital	E&M E1	FXO	FXS
				Partial	Total						
Argentina	Ezeiza	Bolivia (La Paz)		1	14		5	0	11	0	1
		Chile (Santiago)	1	6		1					
		Brazil (Curitiba)		3							
		Paraguay (Asunción)		1							
		Uruguay (Montevideo)	4	3		4					
		Administrative					2				
Bolivia	La Paz	Argentina (Buenos Aires)		1	7		3	0	4	0	4
		Chile (Santiago)		1							
		Brazil (Manaus)		1		1					
		Brazil (Curitiba)		2							
		Paraguay (Asunción)		1							
		Peru (Lima)		1		1					
		Administrative					3				
Brazil	Curitiba	Argentina (Buenos Aires)		3	9		4	0	6	2	1
		Uruguay (Montevideo)		1		1					
		Paraguay (Asunción)		3		1					
		Bolivia (La Paz)		2							
		Administrative					3				
	Manaus	Colombia (Bogota)		1	7	3	3	0	7	0	5
		Guyana (Georgetown)		1							
		French Guiana (Cayenne)		1							
		Bolivia (La Paz)		1		1					
		Venezuela (Maiquetía)		1		1					
		Peru (Lima)		1							
		Suriname (Paramaribo)		1							
		Administrative					4				
	Recife	Uruguay (Montevideo)		1	2		5	0	7	0	1
		French Guiana (Cayenne)		1							
		Administrative					3				
Chile	Santiago	Argentina (Buenos Aires)	1	6	8	1	4	0	8	0	0
		Bolivia (La Paz)		1							
		Peru (Lima)		1		1					
		Administrative					2				

ATS TABLE			ATS Req. CNS1C			REDDIG		Installed voice interfaces			
			Direct	Switched		Direct	Switch	Digital	E&M EI	FXO	FXS
				Partial	Total						
Colombia	Bogota	Panama (Panama)		5	13	1	7	1	0	0	0
		Cenamer ACC		1							
		Kingston ACC		1							
		Curaçao ACC		1							
		Ecuador (Guayaquil)	2	2		1					
		Brazil (Manaus)		3		3					
		Peru (Lima)		2		1					
		Venezuela (Maiquetía)		1		2					
		Administrative					2				
Ecuador	Guayaquil	Colombia (Bogota)	2	2	3	1	4	1	0	0	0
		Peru (Lima)		1		1					
		Cenamer ACC									
		Administrative					3				
French Guiana	Cayenne	Piarco ACC		1	4	1	2	0	0	0	5
		Brazil (Recife)		1							
		Brazil (Manaus)		1							
		Suriname (Paramaribo)		1							
		Administrative					2				
Guyana	Georgetown	Piarco ACC		1	4	1	3	0	0	0	5
		Brazil (Manaus)		1							
		Suriname (Paramaribo)		1							
		Venezuela (Maiquetía)		1							
		Administrative					1				
Panama	Panama	Colombia (Bogota)	3	2	3	N/A	N/A	N/A	N/A	N/A	N/A
		Kingston ACC		1							
		Cenamer ACC	2								
Paraguay	Asunción	Argentina (Buenos Aires)		1	4		1	0	3	0	3
		Bolivia (La Paz)		1							
		Brazil (Curitiba)	1	2		1					
		Administrative					4				
Peru	Lima	Bolivia (La Paz)		1	6	1	5	2	0	0	0
		Brazil (Manaus)		2							
		Chile (Santiago)		1		1					
		Colombia (Bogota)		1		1					
		Ecuador (Guayaquil		1		1					
		Administrative					3				
Suriname	Paramaribo	Brazil (Manaus)		1	4		2	0	0	0	4
		French Guiana (Cayenne)		1							
		Guyana (Georgetown)		1							
		ACC Piarco		1		1					
		Administrative					1				

ATS TABLE			ATS Req. CNS1C			REDDIG		Installed voice interfaces			
			Direct	Switched		Direct	Switch	Digital	E&M EI	FXO	FXS
				Partial	Total						
Trinidad and Tobago	Piarco	Guyana (Georgetown)		1	5	1	0	0	0	0	6
		Venezuela (Maiquetía)		1		1					
		Suriname (Paramaribo)		1		1					
		French Guiana (Cayenne)		1		1					
		ACC San Juan		1							
		Administrative					2				
Uruguay	Montevideo	Argentina (Buenos Aires)	4	3	5	4	2	0	0	4	6
		Brazil (Recife)		1							
		Brazil (Curitiba)		1		1					
		Administrative					2				
Venezuela	Maiquetía	ACC Piarco		1	6	1	6	0	7	0	4
		ACC Curaçao		2							
		ACC San Juan		1							
		Brazil (Manaus)		1		1					
		Colombia (Bogota)	2	3		2					
		Guyana (Georgetown)		1							
		Administrative					1				

Table 2B-1: ATS speech service interfaces

3. Additional ATS speech bandwidth: There are no additional requirements for this service.

Appendix 2C: Required interfaces and additional bandwidth - Radar data

1. In order to determine the **interfaces** required for the routers, Table 2C-1 shows the radar data exchange service, listing the circuits going from each State to the adjacent routers. It includes synchronous circuits (through DB25 ports) as well as those transmitted *via* Ethernet interfaces:

Radar exchange to automated centre			Signal generation				Interfaces	
			Serial		Ethernet			
			Tx	Rx	Tx	Rx	Serial	Ether.
Argentina	Ezeiza	Bolivia (La Paz)	0	TBD	1	TBD	TBD	1
		Chile (Santiago)	TBD	TBD	4	TBD	TBD	
		Brazil (Curitiba)	0	TBD	2	TBD	TBD	
		Paraguay (Asunción)	0	TBD	2	TBD	TBD	
		Uruguay (Montevideo)	1	1	1	TBD	2	
Bolivia	La Paz	Argentina (Buenos Aires)	TBD	TBD	TBD	TBD	0	1
		Chile (Santiago)	TBD	TBD	TBD	TBD	TBD	
		Brazil (Manaus)	TBD	TBD	TBD	TBD	TBD	
		Brazil (Curitiba)	TBD	TBD	TBD	TBD	TBD	
		Paraguay (Asunción)	TBD	TBD	TBD	TBD	TBD	
		Peru (Lima)	TBD	TBD	TBD	TBD	TBD	
Brazil	Curitiba	Argentina (Buenos Aires)	TBD	TBD	TBD	TBD	TBD	1
		Uruguay (Montevideo)	TBD	TBD	TBD	TBD	TBD	
		Paraguay (Asunción)	TBD	TBD	TBD	TBD	TBD	
		Bolivia (La Paz)	TBD	TBD	TBD	TBD	TBD	
	Manaus	Colombia (Bogota)	TBD	TBD	TBD	TBD	TBD	1
		Guyana (Georgetown)	TBD	TBD	TBD	TBD	TBD	
		French Guiana (Cayenne)	TBD	TBD	TBD	TBD	TBD	
		Bolivia (La Paz)	TBD	TBD	TBD	TBD	TBD	
		Peru (Lima)	TBD	TBD	TBD	TBD	TBD	
		Venezuela (Maiquetía)	TBD	TBD	TBD	TBD	TBD	
		Suriname (Paramaribo)	TBD	TBD	TBD	TBD	TBD	
Chile	Santiago	Argentina (Buenos Aires)	TBD	TBD	TBD	TBD	TBD	1
		Bolivia (La Paz)	TBD	TBD	TBD	TBD	TBD	
		Peru (Lima)	TBD	TBD	TBD	TBD	TBD	
Colombia	Bogota	Panama (Panama) (*)	TBD	TBD	TBD	TBD	TBD	1
		Cenamer ACC (*)	TBD	TBD	TBD	TBD	TBD	
		Kingston ACC (*)	TBD	TBD	TBD	TBD	TBD	
		Curaçao ACC (*)	TBD	TBD	TBD	TBD	TBD	
		Ecuador (Guayaquil)	TBD	TBD	TBD	TBD	TBD	
		Brazil (Manaus)	TBD	TBD	TBD	TBD	TBD	
		Peru (Lima)	TBD	TBD	TBD	TBD	TBD	
		Venezuela (Maiquetía)	TBD	TBD	TBD	TBD	TBD	

Radar exchange to automated centre			Signal generation				Interfaces	
			Serial		Ethernet			
			Tx	Rx	Tx	Rx	Serial	Ether.
Ecuador	Guayaquil	Colombia (Bogota)	TBD	TBD	TBD	TBD	TBD	1
		Peru (Lima)	TBD	TBD	TBD	TBD	TBD	
French Guiana	Cayenne	Brazil (Manaus)	TBD	TBD	TBD	TBD	TBD	1
		Suriname (Paramaribo)	TBD	TBD	TBD	TBD	TBD	
Guyana	Georgetown	Brazil (Manaus)	TBD	TBD	TBD	TBD	TBD	1
		Suriname (Paramaribo)	TBD	TBD	TBD	TBD	TBD	
		Venezuela (Maiquetía)	TBD	TBD	TBD	TBD	TBD	
Panama (*)	Panama (*)	Colombia (Bogota)	N/A	N/A	N/A	N/A	N/A	N/A
		Kingston ACC (*)						
		Cenamer ACC (*)						
Paraguay	Asunción	Argentina (Buenos Aires)	TBD	TBD	TBD	TBD	TBD	1
		Bolivia (La Paz)	TBD	TBD	TBD	TBD	TBD	
		Brazil (Curitiba)	TBD	TBD	TBD	TBD	TBD	
Peru	Lima	Bolivia (La Paz)	TBD	TBD	TBD	TBD	TBD	1
		Brazil (Manaus)	TBD	TBD	TBD	TBD	TBD	
		Chile (Santiago)	TBD	TBD	TBD	TBD	TBD	
		Colombia (Bogota)	TBD	TBD	TBD	TBD	TBD	
		Ecuador (Guayaquil	TBD	TBD	TBD	TBD	TBD	
Suriname	Paramaribo	Brazil (Manaus)	TBD	TBD	TBD	TBD	TBD	1
		French Guiana (Cayenne)	TBD	TBD	TBD	TBD	TBD	
		Guyana (Georgetown)	TBD	TBD	TBD	TBD	TBD	
		ACC Piarco	TBD	TBD	TBD	TBD	TBD	
Trinidad and Tobago	Piarco	ACC San Juan (*)	TBD	TBD	TBD	TBD	TBD	1
		Venezuela (Maiquetía)	TBD	TBD	TBD	TBD	TBD	
Uruguay	Montevideo	Argentina (Buenos Aires)	1	1	TBD	TBD	0	1
		Brazil (Brasilia)	TBD	TBD	TBD	TBD	TBD	
Venezuela	Maiquetía	ACC Piarco (*)	TBD	TBD	TBD	TBD	TBD	1
		ACC Curaçao (*)	TBD	TBD	TBD	TBD	TBD	
		ACC San Juan (*)	TBD	TBD	TBD	TBD	TBD	
		Brazil (Manaus)	TBD	TBD	TBD	TBD	TBD	
		Colombia (Bogota)	TBD	TBD	TBD	TBD	TBD	
		Guyana (Georgetown)	TBD	TBD	TBD	TBD	TBD	

Table 2C-1: Radar data exchange service interfaces

(*): States or ACCs that do not belong to the REDDIG. Consequently, although the interfaces are foreseen, the required bandwidth is be calculated.

TBD: to be developed.

2. Additional bandwidth

2.1 A quick review of the table above clearly shows that the additional bandwidth requirement for the exchange of radar data depends exclusively on the MoUs (Memoranda of Understanding) signed or to be signed by the States.

2.2 In this regard, in order to have an initial calculation, it is estimated that each State will transmit and receive either data from a radar or summarised information from its neighbouring States, giving a total of 106 signals (53 transmitted and 53 received).

2.3 Therefore, consideration should be given to the following bandwidth increases contained in Table 2C – 2:

Radar exchange with automated centre		**Total Tx/RX**	**BW (Kbps)**
Argentina (*)	Ezeiza	8	76.8
Bolivia	La Paz	12	115.2
Brazil	Curitiba	8	76.8
	Manaus	14	134.4
Chile	Santiago	6	57.6
Colombia (+)	Bogota	8	76.8
Ecuador	Guayaquil	4	38.4
French Guiana	Cayenne	4	38.4
Guyana	Georgetown	6	57.6
Paraguay	Asunción	6	57.6
Peru	Lima	10	96
Suriname	Paramaribo	8	76.8
Trinidad and Tobago	Piarco	2	19.2
Uruguay (*)	Montevideo	2	19.2
Venezuela (+)	Maiquetía	8	76.8
Total additional bandwidth			**1017.6**

Table 2C-2: Foreseen bandwidth increases

(*): For Argentina and Uruguay, exchange consumption since 1999 has not been included, since it forms part of the current bandwidth of the REDDIG.

(+): For Colombia and Venezuela, only the links with the REDDIG States have been taken into account.

2.4 Additional bandwidth for the exchange of radar data: 1017.6 Kbps.

Appendix 2D: Required interfaces and additional bandwidths – Teleconferencing

1. Table 2D-1 identifies the **interfaces** required for the routers for the teleconferencing service, listing the flow management units/flow management positions to be interconnected.

Teleconferencing		FMU/ FMP (*)	Interfaces	
			E&M FXS	Digital E1
Argentina	Ezeiza	1	1	
	Mendoza	1		
	Córdoba	1		
	Resistencia	1		
	Comodoro Rivadavia	1		
Bolivia	La Paz	1	1	
Brazil	Curitiba	1	1	
	Manaus	1		
	Atlántico	1		
	Brasilia	1		
	Recife	1		
Chile	Santiago	1	1	
	Puerto Montt	1		
	Punta Arenas	1		
Colombia	Bogota	1		1
	Cali	1		
	Medellín	1		
	Barranquilla	1		
Ecuador	Guayaquil	1		1
French Guiana	Rochambeau	1	1	
Guyana	Georgetown	1	1	
Paraguay	Asunción	1	1	
Peru	Lima	1		1
Suriname	Paramaribo	1	1	
Trinidad and Tobago	Piarco	1	1	
Uruguay	Montevideo	1	1	
Venezuela	Maiquetía	1	1	

Table 2D-1: Required (existing) interfaces for the teleconferencing service

2. **Additional bandwidth for teleconferencing:** For this non-permanent service, it is estimated that the interfaces and remaining bandwidth capacity of the REDDIG are sufficient to absorb the demand, even during peak voice and data traffic. Therefore, **no additional bandwidth is required**.

Appendix 2E: Required interfaces and additional bandwidth – AMHS

1. In order to determine the minimum bandwidth required for the operation between two MTAs, two tests (Test No. 1 and Test No. 2) were conducted in completely different scenarios.

2. **Test No. 1: Ezeiza (CIPE) MTA – Manaus MTA**

2.1 *IP addresses*: Assigned according to the Regional IP Addressing Plan. The following test scheme was used (Figure 2E-1)

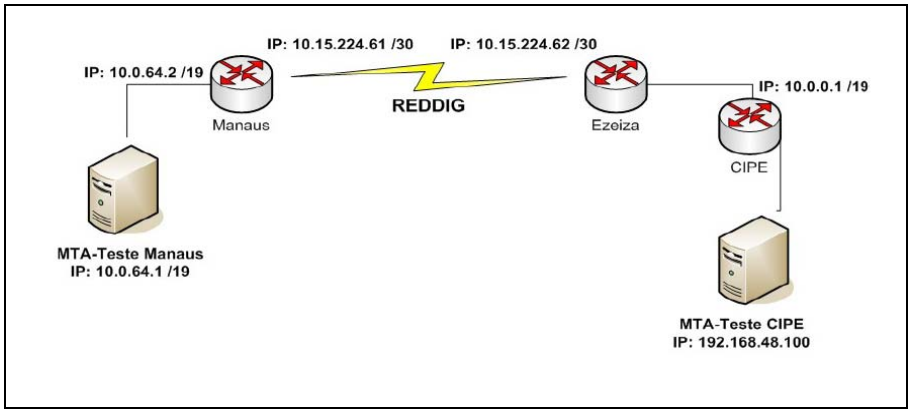

Figure 2E-1: Connectivity scheme

2.2 *Configurations*:

2.2.1 Manaus MTA: PRMD=EG, O=EGGA, OU=EGGA, CN=EGGAXXYY

2.2.2 CIPE MTA: PRMD=SA, O=CIPE, OU=CIPE, CN=CIPE****, (****) ten different terminals.

2.2.3 In this respect, Figure 2E-2 shows the routing configuration in the CIPE MTA.

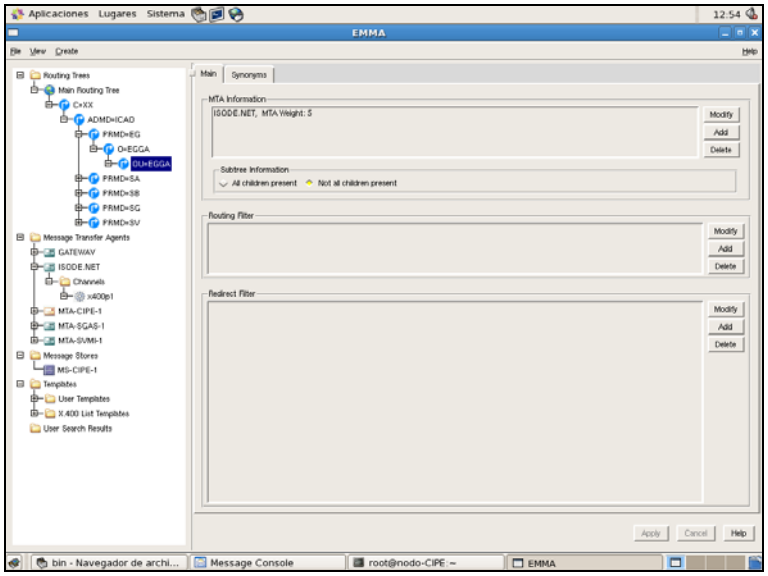

Figure 2E-2: CIPE MTA routing

2.3 *Tests*:

2.3.1 These tests were scheduled with a view to establishing the capacity of the REDDIG for various transmission speeds and message sizes.

2.3.2 In this respect, Table 2E-1 presents a summary of the part of the trials (those conducted with 1-KB messages and configured speeds of 64, 32 and 4,8 kbps).

Test No.	Description	Link rate (Kbits/s)	Total time (hh/mm/ss)	Exchange of messages / hour	Exchange of messages / second	Transit time of each message (seconds)	Remarks
1	Delivery of 5,000 1-KB messages	64	0:59:21	5000	1.39	0.72	
2	Delivery of 5,000 1-KB messages	32	2:18:00	2174	0.6	1.66	
3	Delivery of 25 1-KB messages	4.8	11:42:00 (*)	427	0.12	8.43	To be completed

(*): if the test had been with 5,000 messages

Table 2E-1: Tests and results obtained

(*) A calculation is made of the equivalent time if traffic had been of 5,000 messages

2.4 *Evidence*: Figure 2E-3 presents parts of the CIPE MTA event log, showing the different sizes of the scripts received (different colours), the time used for the transfer, and the transfer rates:

8/ 5 00:00:28 x400p1 07177 (#501) N-MTA_X400-Notice <<< [/PRMD=EG/ADMD=ICAO/C=XX/; isode.net.1841201-100804.191103] message received from cn=x400p1, cn=ISODE.NET, cn=Messaging Configuration,ou=Address Book,c=AR

8/ 5 00:00:28 x400p1 07177 (#501) N-MTA-Notice Transfer Completed (inbound): 6604 bytes in 2.54 seconds (2.53 Kbytes/s)

8/ 5 00:00:29 x400p1 07174 (#501) N-MTA-Notice Recipient 1 '/CN=CIPEZTZX/OU=CIPE/O=CIPE/PRMD=SA/ADMD=ICAO/C=XX/' mta 'MTA-CIPE-1'

8/ 5 00:00:29 x400p1 07174 (#501) N-MTA-Notice Transfer Completed (inbound): 6604 bytes in 1.27 seconds (5.04 Kbytes/s)

8/ 5 00:00:31 x400p1 07177 (#501) N-MTA-Notice Transfer Completed (inbound): 6604 bytes in 2.29 seconds (2.81 Kbytes/s)

8/ 5 00:00:31 x400p1 07174 (#501) N-MTA-Notice Transfer Completed (inbound): 6604 bytes in 1.19 seconds (5.39 Kbytes/s)

8/ 5 00:00:33 x400p1 07174 (#501) N-MTA-Notice Transfer Completed (inbound): 6604 bytes in 1.19 seconds (5.38 Kbytes/s)

8/ 5 00:19:39 x400p1 07737 (#501) N-MTA-Notice Transfer Completed (inbound): 11722 bytes in 2.83 seconds (4.04 Kbytes/s)

8/ 5 00:19:40 x400p1 07740 (#501) N-MTA-Notice Transfer Completed (inbound): 11722 bytes in 1.82 seconds (6.27 Kbytes/s)

Figure 2E-3: CIPE MTA test log Manaus - CIPE

2.5 *Analysis of test results in relation to current traffic*:

2. Buenos Aires – Ezeiza (ARGENTINA)

dir 383 = BUENOS AIRES

Dia	Tráfego Total	Hora de Pico	Tráfego na Hora de Pico
1/7/2009	4.201	11:24 AS 12:24	250
2/7/2009	4.257	16:54 AS 17:55	242
3/7/2009	3.961	11:10 AS 12:10	228
4/7/2009	3.301	16:54 AS 17:54	173
5/7/2009	3.218	16:54 AS 17:54	179
6/7/2009	3.549	22:39 AS 23:39	174
7/7/2009	3.753	18:09 AS 19:09	318
8/7/2009	3.522	10:55 AS 11:54	179
9/7/2009	3.411	16:54 AS 17:54	158
10/7/2009	3.550	10:39 AS 11:40	236
11/7/2009	3.335	10:54 AS 11:54	210
12/7/2009	3.162	11:09 AS 12:09	142
13/7/2009	3.816	16:54 AS 17:54	201
14/7/2009	3.615	12:09 AS 13:09	218
15/7/2009	3.610	22:54 AS 23:57	175
16/7/2009	3.653	10:39 AS 11:39	186
17/7/2009	3.763	10:09 AS 11:09	246
18/7/2009	3.302	10:54 AS 11:54	189
19/7/2009	2.988	16:24 AS 17:24	170
20/7/2009	3.442	14:39 AS 15:39	176
21/7/2009	3.832	10:39 AS 11:39	214
22/7/2009	3.839	10:39 AS 11:39	233
23/7/2009	3.796	10:54 AS 11:54	216
24/7/2009	3.514	23:24 AS 00:24	151
25/7/2009	3.228	16:54 AS 17:54	162
26/7/2009	3.258	11:24 AS 12:25	166
27/7/2009	3.593	16:39 AS 17:39	179
28/7/2009	3.748	16:54 AS 17:54	198
29/7/2009	3.844	10:39 AS 11:39	203
30/7/2009	3.748	04:54 AS 05:54	167
31/7/2009	3.825	10:54 AS 11:54	190
Total geral	111.634		

Table 2E-2: SBBR-SAEZ AFTN peak hour traffic

2.5.1 Table 2E-2 presents the monthly traffic of messages between Brazil and Argentina whose average numbers repeat themselves in the last 12 months.

2.5.2 An analysis of the maximum number of messages during peak hour (7/7/2009), which was **318 messages**, leads to the conclusion that a bandwidth of 4,8 kbit/s is reasonable for the configuration of the AMHS circuit between Brazil and Argentina. Since the transmission between the two countries currently accounts for the highest bandwidth utilisation for said application in the REDDIG, it may be concluded that the rate of 4,8 kbit/s or 2,4 kbit/s could be used for all cases in the SAM States.

2.5.3 However, Table 2E-3 summarises AFTN peak hour traffic between Brazil and Atlanta, which has a maximum number of messages during peak hour (2/7/2009) of **1745 messages**. For that circuit, a rate of 9,6 kbit/s may be enough, but must be checked with continued testing of the 16-kbit/s and 9,6-kbit/s rates.

1. Atlanta (EUA)

dir 94 = ATLANTA

Dia	Tráfego Total	Hora de Pico	Tráfego na Hora de Pico
1/7/2009	17.337	11:40 AS 12:39	940
2/7/2009	19.728	18:25 AS 19:25	1.745
3/7/2009	19.794	10:54 AS 11:54	1.668
4/7/2009	17.145	16:39 AS 17:40	1.075
5/7/2009	17.684	16:09 AS 17:09	914
6/7/2009	17.486	16:39 AS 17:39	1.201
7/7/2009	17.661	18:09 AS 19:09	1.090
8/7/2009	18.596	15:54 AS 16:54	1.184
9/7/2009	17.044	06:24 AS 07:25	1.200
10/7/2009	17.606	22:39 AS 23:39	939
11/7/2009	13.803	00:00 AS 00:54	717
12/7/2009	13.071	12:09 AS 13:09	741
13/7/2009	15.186	19:10 AS 20:09	824
14/7/2009	13.159	21:09 AS 22:09	763
15/7/2009	12.682	21:54 AS 22:54	687
16/7/2009	12.473	21:09 AS 22:09	710
17/7/2009	12.816	15:39 AS 16:39	598
18/7/2009	11.722	03:54 AS 04:54	779
19/7/2009	9.418	12:24 AS 13:24	621
20/7/2009	12.863	18:54 AS 19:54	986
21/7/2009	13.310	23:09 AS 00:09	955
22/7/2009	12.822	20:39 AS 21:39	651
23/7/2009	12.337	20:24 AS 21:24	736
24/7/2009	9.958	19:54 AS 20:54	369
25/7/2009	11.208	21:24 AS 22:24	593
26/7/2009	10.661	20:24 AS 21:24	678
27/7/2009	13.051	11:54 AS 12:54	661
28/7/2009	13.139	21:39 AS 22:39	755
29/7/2009	13.171	17:09 AS 18:09	995
30/7/2009	13.177	18:54 AS 19:54	682
31/7/2009	11.776	20:09 AS 21:09	658
Total geral	441.884		

Table 2E-3: SBBR-Atlanta AFTN traffic during peak hour

3. **Test No. 2: MTA Ezeiza (CIPE) –XX MTA** (XX: test, simulating another country, Ethiopia in this case)

3.1 *IP addresses*: according to the following test scheme (Figures 2E-3 and 2E-4):

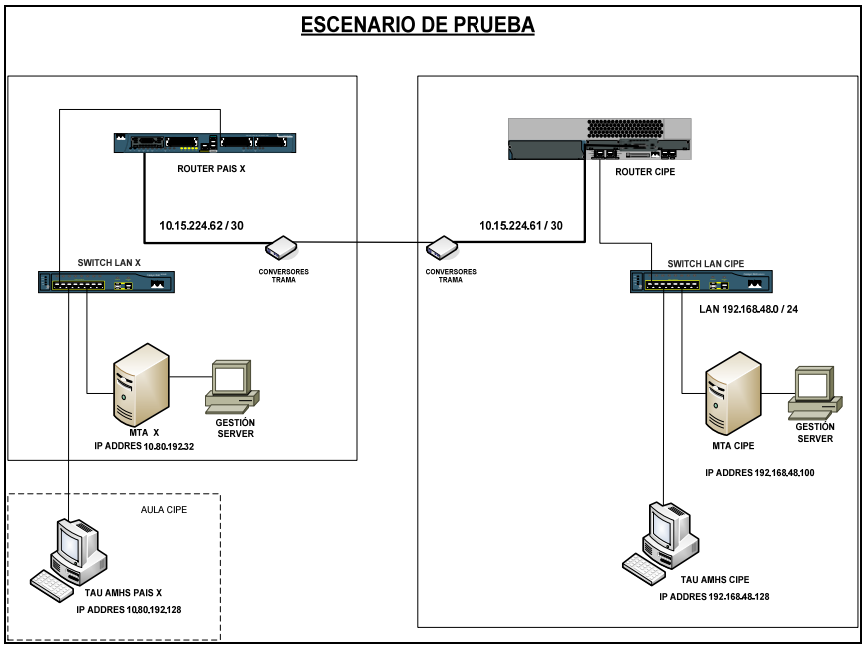

Figure 2E-3: CIPE MTA / XX MTA connectivity scheme

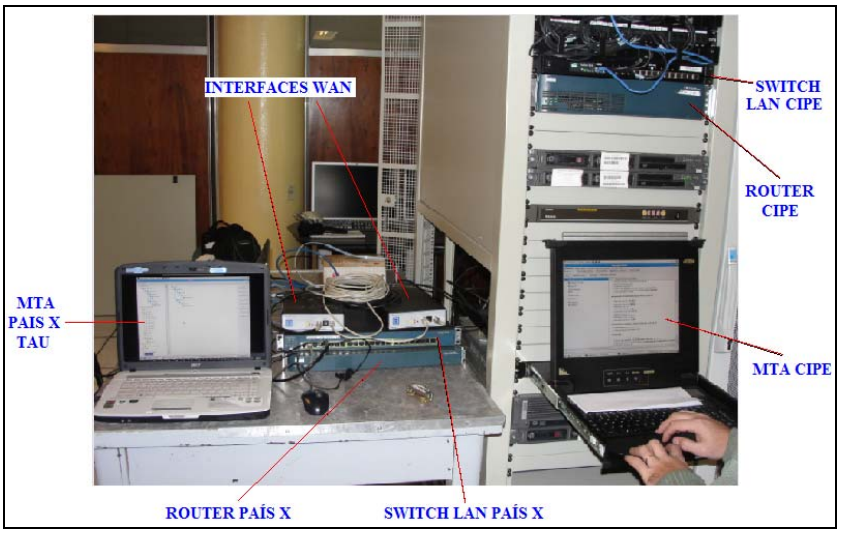

Figure 2E-4: Image of the test scenario

3.2 *Configurations*:

3.2.1 XX MTA: PRMD=HA, O=HAAB, OU=HAAB, CN=HAABYFYX

3.2.2 CIPE MTA: PRMD=SA, O=CIPE, OU=CIPE, CN=CIPE****, where **** are ten different terminals.

3.2.3 Next, Figure 2E-5 shows a print screen (in CIPE) of the connectivity test with the other MTA:

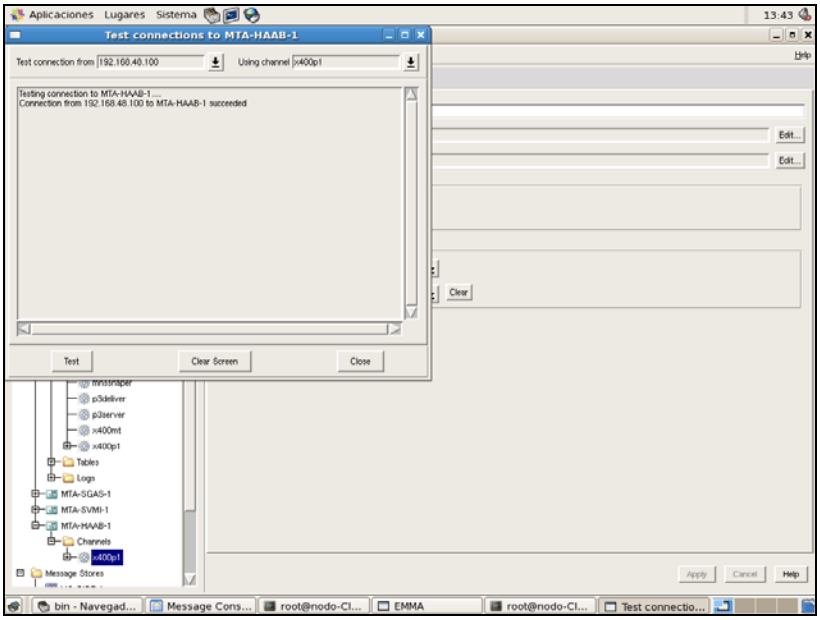

Figure 2 E-5: Certifying the connectivity with the other MTA

3.3 *Tests*

3.3.1 Two-way delivery of 500-message packages, checking the delivery rate at the terminal of the opposite MTA, varying the link rate by modifying the parameters of the associated routers.

3.3.2 Next, Figure 2E-6 presents part of the event log of the XX MTA, showing the size of the messages, transfer time, and incoming and outgoing transfer rates:

Examples of messages received at the XX MTA (MTA Event)

8/11 13:42:00 x400p1 20693 (#501) N-MTA_X400-Notice <<< [/PRMD=HA/ADMD=ICAO/C=XX/; localhost..0309501-100806.121319] message received from cn=x400p1,cn=MTA-HAAB-1, cn=Messaging Configuration,ou=Address Book,c=AR
8/11 13:42:00 x400p1 20693 (#501) N-MTA-Notice Transfer Completed (inbound): 674 bytes in 0.01 seconds (47.01 Kbytes/s)
8/11 13:42:00 x400p1 20692 (#501) N-MTA_X400-Notice <<< [/PRMD=HA/ADMD=ICAO/C=XX/; localhost..0302901-100806.120935] message received from cn=x400p1,cn=MTA-HAAB-1, cn=Messaging Configuration,ou=Address Book,c=AR
8/11 13:42:00 x400p1 20692 (#501) N-MTA-Notice Transfer Completed (inbound): 672 bytes in 0.01 seconds (54.69 Kbytes/s)
8/11 13:58:02 x400p1 20773 (#501) N-MTA_X400-Notice <<< [/PRMD=HA/ADMD=ICAO/C=XX/;localhost..0465701-100806.123120] DR received from cn=x400p1,cn=MTA-HAAB-1,cn=Messaging Configuration,ou=Address Book,c=AR
8/11 13:58:02 x400p1 20773 (#501) N-MTA-Notice Transfer Completed (inbound): 464 bytes in 0.00 seconds (90.62 Kbytes/s)
8/11 14:05:21 x400p1 20811 (#501) N-MTA_X400-Notice <<< [/PRMD=HA/ADMD=ICAO/C=XX/; localhost..2943401-100806.123839] DR received from cn=x400p1,cn=MTA-HAAB-1,cn=Messaging Configuration,ou=Address Book,c=AR
8/11 14:05:21 x400p1 20811 (#501) N-MTA-Notice Transfer Completed (inbound): 464 bytes in 0.00 seconds (113.28 Kbytes/s)

Examples of messages sent by the XX MTA (MTA Event)

8/11 14:09:30 pp.qmgr2 20287 (pp) N-IOevent-ConnectionClosed Normal Connection Closure
8/11 14:09:30 x400p1 20848 (pp) N-MTA-Notice Transfer Completed (outbound): 663 bytes in 0.10 seconds (6.29 Kbytes/s)
8/11 14:09:30 x400p1 20848 (pp) N-MTA_X400-Notice >>> Message [/PRMD=SA/ADMD=ICAO/C=XX/; localhost..2083107-100811.170928] transfered to <cn=x400p1,cn=MTA-HAAB-1, cn=Messaging Configuration,ou=Address Book, c=AR>
8/11 14:09:30 x400p1 20848 (pp) N-MTA-Notice Transfer Completed (outbound): 665 bytes in 0.03 seconds (17.55 Kbytes/s) 8/11 14:09:30 x400p1 20848 (pp) N-MTA_X400-Notice >>> Message [/PRMD=SA/ADMD=ICAO/C=XX/; localhost..2083108-100811.170928] transfered to <cn=x400p1,cn=MTA-HAAB-1,cn=Messaging Configuration,ou=Address Book,c=AR>
8/11 14:09:30 x400p1 20848 (pp) N-MTA-Notice Transfer Completed (outbound): 665 bytes in 0.01 seconds (34.18 Kbytes/s)

Figure 2E-6: MTA Log

3.4 *II test results*:

3.4.1 Delivery times practically did not vary, regardless of router configuration (the transfer rate was high in all cases), since the physical connection medium did not change. Therefore, it was not possible to determine the minimum link rate under message stress conditions.

3.4.2 Consequently, these tests did not add any important additional information to the tests conducted between Manaus and Ezeiza.

4. **Additional bandwidth**

4.1 Next, Table 2E-4 presents the conventional **AMHS connectivity** in the SAM Region and in Trinidad and Tobago.

4.2 Likewise, for the purpose of calculating the additional bandwidth, the primary conclusions of the tests conducted between Manaus and Ezeiza have been adopted. This involves assigning 4.8 Kbps between each pair of States, with the exception of messages from (or switched by) Brazil and Peru to USA (Atlanta), and which will travel between each of the cited States and Colombia (Bogota), to enter the MEVA II at this location to continue to its final destination, *via* Miami, for which 9.6 Kbps were assigned, in addition to the 4.8 Kbps assigned to the traffic between each pair of States.

4.3 Consequently, between Brazil (Manaus) – Colombia (Bogota) and Peru (Lima) – Colombia (Bogota), the width assigned is 14.4 Kbps (9.6 Kbps + 4.8 Kbps). The cited values are shown in column BW (Kbps).

AMHS TABLE			**BW (Kbps)**
Argentina	Ezeiza	Bolivia (La Paz)	4.8
		Chile (Santiago)	4.8
		Brazil (Curitiba)	4.8
		Paraguay (Asunción)	4.8
		Peru (Lima)	4.8
		Uruguay (Montevideo)	4.8
Bolivia	La Paz	Argentina (Ezeiza)	4.8
		Brazil (Curitiba)	4.8
		Peru (Lima)	4.8
Brazil	Curitiba	Argentina (Ezeiza)	4.8
		Uruguay (Montevideo)	4.8
		Paraguay (Asunción)	4.8
		Bolivia (La Paz)	4.8
	Manaus	Colombia (Bogota) (*)	14.4
		Guyana (Georgetown)	4.8
		French Guiana (Cayenne)	4.8
		Peru (Lima)	4.8
		Suriname (Paramaribo)	4.8
	Recife	Venezuela (Maiquetía)	4.8
Chile	Santiago	Argentina (Ezeiza)	4.8
		Peru (Lima)	4.8
Colombia	Bogota	Ecuador (Guayaquil)	4.8
		Brazil (Manaus) (*)	14.4
		Peru (Lima) (*)	14.4
		Venezuela (Caracas)	4.8
Ecuador	Guayaquil	Colombia (Bogota)	4.8
		Peru (Lima)	4.8
		Venezuela (Maiquetía)	4.8
French Guiana	Cayenne	Venezuela (Maiquetía)	4.8
		Brazil (Manaus)	4.8
Guyana	Georgetown	Brazil (Manaus)	4.8
		Suriname (Paramaribo)	4.8
		Trinidad and Tobago (Piarco)	4.8
		Venezuela (Caracas)	4.8
Paraguay	Asunción	Argentina (Ezeiza)	4.8

AMHS TABLE			BW (Kbps)
Peru	Lima	Venezuela (Maiquetía)	4.8
		Argentina (Ezeiza)	4.8
		Bolivia (La Paz)	4.8
		Brazil (Manaus)	4.8
		Chile(Santiago)	4.8
		Colombia (Bogota) (*)	14.4
		Ecuador (Guayaquil	4.8
Suriname	Paramaribo	Brazil (Manaus)	4.8
		Venezuela (Maiquetía)	4.8
		Guyana (Georgetown)	4.8
Trinidad and Tobago	Piarco	Venezuela (Maiquetía)	4.8
		Guyana (Georgetown)	4.8
Uruguay	Montevideo	Argentina (Ezeiza)	4.8
		Brazil (Brasilia)	4.8
Venezuela	Maiquetía	Peru (Lima)	4.8
		Ecuador (Guayaquil)	4.8
		Brazil (Recife)	4.8
		Colombia (Bogota)	4.8
		Guyana (Georgetown)	4.8
		Suriname (Paramaribo)	4.8
		French Guiana (Cayenne)	4.8
		Trinidad and Tobago (Piarco)	4.8
			316.8

Table 2E-4: AMHS connectivity and bandwidth calculation

(*): As already stated, the combined traffic between each pair of States (Brazil – Colombia and Peru – Colombia) and the one originating in Peru and Brazil, but which continues to Miami/Atlanta *via* MEVA II, are added.

4.4 **Estimated additional AMHS bandwidth**: 316.8 Kbps.

Appendix 2F: Required interfaces and additional bandwidth – AIDC

1. **Interfaces**

1.1 Table 2F-1 below shows the future AIDC service in the SAM Region and in Trinidad and Tobago.

1.2 It includes all the services that should go from each State to the adjacent routers, either for ACC/ACC, ACC/APP or APP/TWR communications.

AIDC TABLE			Number	Total	Ethernet Interfaces
Argentina	Buenos Aires	Bolivia (La Paz)	1	5	1
		Chile (Santiago)	7		
		Brazil (Curitiba)	3		
		Paraguay (Asunción)	1		
		Uruguay (Montevideo)	7		
Bolivia	La Paz	Argentina (Buenos Aires)	1	6	1
		Chile (Santiago)	1		
		Brazil (Manaus)	1		
		Brazil (Curitiba)	2		
		Paraguay (Asunción)	1		
		Peru (Lima)	1		
Brazil	Curitiba	Argentina (Buenos Aires)	3	4	1
		Uruguay (Montevideo)	1		
		Paraguay (Asunción)	3		
		Bolivia (La Paz)	2		
	Manaus	Colombia (Bogota)	1	7	1
		Guyana (Georgetown)	1		
		French Guiana (Rochambeau)	1		
		Bolivia (La Paz)	1		
		Venezuela (Maiquetía)	1		
		Peru (Lima)	1		
		Suriname (Paramaribo)	1		
	Recife	Uruguay (Montevideo)	1	2	1
		French Guiana (Rochambeau)	1		
Chile	Santiago	Argentina (Buenos Aires)	7	3	1
		Bolivia (La Paz)	1		
		Peru (Lima)	1		
Colombia	Bogota	Panama (Panama)	5	5	1
		Ecuador (Guayaquil)	4		
		Brazil (Manaus)	3		
		Peru (Lima)	2		
		Venezuela (Maiquetía)	1		
Ecuador	Guayaquil	Colombia (Bogota)	4	2	1
		Peru (Lima)	1		

AIDC TABLE			Number	Total	Ethernet Interfaces
French Guiana	Rochambeau	ACC Piarco	1	4	1
		Brazil (Recife)	1		
		Brazil (Manaus)	1		
		Suriname (Paramaribo)	1		
Guyana	Georgetown	ACC Piarco	1	4	1
		Brazil (Manaus)	1		
		Suriname (Paramaribo)	1		
		Venezuela (Maiquetía)	1		
Paraguay	Asunción	Argentina (Buenos Aires)	1	3	1
		Bolivia (La Paz)	1		
		Brazil (Curitiba)	3		
Peru	Lima	Bolivia (La Paz)	1	5	1
		Brazil (Manaus)	2		
		Chile(Santiago)	1		
		Colombia (Bogota)	1		
		Ecuador (Guayaquil	1		
Suriname	Panamaribo	Brazil (Manaus)	1	4	1
		French Guiana (Rochambeau)	1		
		Guyana (Georgetown)	1		
		ACC Piarco	1		
Trinidad and Tobago	Piarco	Guyana (Georgetown)	1	4	1
		Venezuela (Maiquetía)	1		
		Suriname (Paramaribo)	1		
		French Guiana (Cayenne)	1		
Uruguay	Montevideo	Argentina (Buenos Aires)	7	3	1
		Brazil (Recife)	1		
		Brazil (Curitiba)	1		
Venezuela	Maiquetía	ACC Piarco	1	4	1
		Brazil (Manaus)	1		
		Colombia (Bogota)	5		
		Guyana (Georgetown)	1		

Table 2F-1: AIDC Service

2. **Bandwidth**

2.1 Regarding this service, there are 3 operational exchange modalities:

2.1.1 *Via* AFTN

2.1.2 *Via* AMHS

2.1.3 Directly between automated systems, *via* ATN over IP.

2.2 For the *first two cases*, these are AFTN messages generated/received by the automated systems and that travel through the respective AFTN or AMHS systems (or a combination of the two). Therefore, the increase in information will be reflected only as an increase in the number of AFTN messages circulating over the ATN.

2.3 Since ATS traffic historically accounts for only 15% of the total AFTN traffic, a hypothetical 300% increase in ATS messages will only be reflected in a 30% increase of AFTN traffic.

2.4 For the *third case*, each centre will send the information to the corresponding adjacent centre, and the increase in bandwidth will depend on the number of control messages that each switched centre will generate, which obviously will depend on the surrounding air traffic.

2.5 Furthermore:

2.5.1 As the service is installed in the various States, the need for greater bandwidth for this service will gradually and slightly increase.

2.5.2 A greater bandwidth will be required once this service has been operationally disseminated throughout the Region, while voice handover of flights continues to be *temporarily* mandatory.

2.5.3 Once this phase is completed and voice communications gradually are deactivated, bandwidth consumption drops until there is no longer the need to continue using speech circuits.

2.6 At that moment, the net bandwidth (increase through AIDC – reduction of ATS speech) will be negative, that is, there will be a reduction of bandwidth requirement.

3. **Additional bandwidth for AIDC**

3.1 No additional bandwidth is required for this service.

Appendix 2G: Required interfaces and additional bandwidth - Exchange between automated systems

1. Interfaces

1.1 Table 2G-1 below shows the data exchange service using Asterix 62 and 63 between automated systems in the SAM Region and in Trinidad and Tobago.

Automated system interconnection table			Number	Total	Ethernet
Argentina	Ezeiza	Bolivia (La Paz)	1	6	1
		Chile (Santiago)	1		
		Brazil (Curitiba)	1		
		Paraguay (Asunción)	1		
		Uruguay (Montevideo)	1		
Bolivia	La Paz	Argentina (Buenos Aires)	1	6	1
		Chile (Santiago)	1		
		Brazil (Manaus)	1		
		Brazil (Curitiba)	1		
		Paraguay (Asunción)	1		
		Peru (Lima)	1		
Brazil	Curitiba	Argentina (Buenos Aires)	1	4	1
		Uruguay (Montevideo)	1		
		Paraguay (Asunción)	1		
		Bolivia (La Paz)	1		
	Manaus	Colombia (Bogota)	1	8	1
		Guyana (Georgetown)	1		
		French Guiana (Cayenne)	1		
		Argentina (Buenos Aires)	1		
		Bolivia (La Paz)	1		
		Peru (Lima)	1		
		Venezuela (Maiquetía)	1		
		Suriname (Paramaribo)	1		
Chile	Santiago	Argentina (Buenos Aires)	1	3	1
		Bolivia (La Paz)	1		
		Peru (Lima)	1		
		Panama (Panama)	1		1
		Ecuador (Guayaquil)	1		
		Brazil (Manaus)	1		
		Peru (Lima)	1		
		Venezuela (Maiquetía)	1		
Ecuador	Guayaquil	Colombia (Bogota)	1	2	1
		Peru (Lima)	1		
French Guiana	Rochambeau	ACC Piarco	1	3	1
		Brazil (Manaus)	1		
		Suriname (Paramaribo)	1		

Automated system interconnection table			Number	Total	Ethernet
Guyana	Georgetown	ACC Piarco	1	4	1
		Brazil (Manaus)	1		
		Suriname (Paramaribo)	1		
		Venezuela (Maiquetía)	1		
Paraguay	Asunción	Argentina (Buenos Aires)	1	3	1
		Bolivia (La Paz)	1		
		Brazil (Curitiba)	1		
Peru	Lima	Bolivia (La Paz)	1	5	1
		Brazil (Manaus)	1		
		Chile (Santiago)	1		
		Colombia (Bogota)	1		
		Ecuador (Guayaquil	1		
Suriname	Paramaribo	Brazil (Manaus)	1	4	1
		French Guiana (Rochambeau)	1		
		Guyana (Georgetown)	1		
		ACC Piarco	1		
Trinidad and Tobago	Piarco	Venezuela (Maiquetía)	1	1	1
Uruguay	Montevideo	Argentina (Buenos Aires)	1	2	1
		Brazil (Brasilia)	1		
Venezuela	Maiquetía	ACC Piarco	1	4	1
		Brazil (Manaus)	1		
		Colombia (Bogota)	1		
		Guyana (Georgetown)	1		

Table 2G-1: Exchange of data between automated centres

2. Bandwidth

2.1 The evolution of the new system utilisation/required bandwidth ratio follows the same analogy as the AIDC service, that is:

2.1.1 As the service is installed in the various States, the need for greater bandwidth for this service will gradually and slightly increase.

2.1.2 A greater bandwidth will be required once this service has been operationally disseminated throughout the Region, while “radar to automated centre” transmissions continue to be *temporarily* mandatory.

2.1.3 Once this phase is completed, the net bandwidth (increase due to exchange between centres - traditional reduction) will be negative, that is, the bandwidth requirement will be reduced or, at least, will remain the same.

3. Conclusion

3.1 **Additional bandwidth for the exchange between automated centres:** No additional bandwidth is required for this service.

Appendix 2H: Required interfaces and additional bandwidth - ADS-B

1. Interfaces

1.1 There should be no major *interface* requirements, since the market currently offers data output over IP. Since this offering is expected to grow, only ATN access switch free ports shall be used.

1.2 This service will replace or supplement radar information transmission in two stages, in a similar way as for radar exchange, that is:

1.2.1 *¨ADS-B sensor-to-automated centre¨ modality*: As the service is installed in the various States, the need for greater bandwidth for this service will gradually increase. The corresponding calculation is done at the end of this Appendix.

1.2.2 *¨Radar information exchange between automated centres¨ modality*: A greater bandwidth will be required once this service has been operationally disseminated throughout the Region, while "ADS-B sensor-to-automated centre¨ transmissions continue to be *temporarily* mandatory.

1.2.3 Once this phase is completed, the net bandwidth (increase due to exchange between centres - traditional reduction) will be negative, that is, the bandwidth requirement will be reduced or, at least, will remain the same.

2. Bandwidth

2.1 In this case, it is assumed that each State will exchange information of one (1) ADS-B sensor with one (1) adjacent State, that is two (2) signals are calculated per State, each of 9.6 Kbps (identical to data radar).

2.2 Accordingly, Table 2H-1 shows the additional bandwidth increase for the service:

Data exchange with an automated centre		Total Tx/RX	BW (Kbps)
Argentina	Ezeiza	2	19.2
Bolivia	La Paz	2	19.2
Brazil	Curitiba	2	19.2
	Manaus	2	19.2
	Manaus	2	19.2
Chile	Santiago	2	19.2
Colombia	Bogota	2	19.2
Ecuador	Guayaquil	2	19.2
French Guiana	Cayenne	2	19.2
Guyana	Georgetown	2	19.2
Paraguay	Asunción	2	19.2
Peru	Lima	2	19.2
Suriname	Paramaribo	2	19.2

Data exchange with an automated centre		Total Tx/RX	BW (Kbps)
Trinidad and Tobago	Piarco	2	19.2
Uruguay (*)	Montevideo	2	19.2
Venezuela	Maiquetía	2	19.2
Total (Kbps)			**307.2**

Table 2H-1: Additional bandwidth for ADS-B

3. Conclusion

3.1 **Additional bandwidth requirement for ADS-B**: 307.2 Kbps

Appendix 2I - Table CNS1b - Plan of Routers for the SAM Region

1. The REDDIG II shall be based on IP and the boundary elements will be the routers. Therefore, all the services listed in Activity 1 (and described in detail in the previous Appendices) shall be based on them.

2. In this case, Table CNS 1Ba – Regional Router Plan/SAM Region**,** should be thoroughly reviewed to make sure that voice communications follow the direct path between the routers of two adjacent ACCs (avoiding double hop, in the case of a satellite solution).

3. Furthermore, it was deemed important, without modifying the original structure, to subdivide the columns of said Table in order to accommodate aggregate parameters to quickly visualize the already established links and services, the initial bandwidth, the backbone technology currently supporting them, the protocols used or to be used, etc.

Appendix 2I - Table CNS1b - Routers Plan of the SAM Region

Administration and location		Type of router	Type of interconnection	Connected router	Link rate		Link Protocol						*Via*		Target date	Remarks	
							Physical layer - link		IP version		Routing protocol						
Admin.	Location				Current	Future	Current	Future	Current	Future	Current	Future	Current	Future		Current	Future
1		2	3	4	5		6							7	8	9	
Argentina	Ezeiza	IP	Inter Regional	AFI (Johannesburg)	N/A	TBD	FDMA FR	TBD	N/A	IPv6	N/A	TBD	CAFSAT	CAFSAT	TBD	B	E
				EUR (Canary Is.)	19.2	TBD			IPv6	IPv6	BGP	TBD			2010	D	D
		IP	Intra Regional	Bolivia (La Paz)	N/A	TBD	TDMA FR - ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2012	B	F
				Chile (Santiago)	N/A				N/A		N/A				2011	B	F
				Brazil (Curitiba)	N/A				N/A		N/A				2011	B	F
				Brazil (Manaus)	64k				IPv4		Static				2010	D	N/A
				Paraguay (Asunción)	64K				IPv4		Static				2009	B	F
				Uruguay (Montevideo)	64k				IPv4		Static				2010	C	F
Bolivia	La Paz	IP	Intra Regional	Argentina (Ezeiza)	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2012	B	F
				Chile (Santiago)	N/A				N/A		N/A				2012	B	F
				Brazil (Manaus)	N/A				N/A		N/A				2012	B	F
				Brazil (Curitiba)	N/A				N/A		N/A					B	F
				Paraguay (Asunción)	N/A				N/A		N/A					B	F
				Peru (Lima)	N/A				N/A		N/A				2012	B	F

A	AFTN
B	AFTN + ATS speech
C	AFTN + ATS speech + radar
D	AMHS
E	AMHS + AIDC + teleconference
F	AMHS + AIDC + teleconference + radar

Administration and location		Type of router	Type of interconnection	Connected router	Link rate		Link Protocol						Via		Target date	Remarks	
							Physical layer - link		IP version		Routing protocol						
Admin.	Location				Current	Future	Current	Future	Current	Future	Current	Future	Current	Future		Current	Future
1		2	3	4	5		6							7	8	9	
Brazil	Curitiba	IP	Intra Regional	Argentina (Ezeiza)	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2010	B	F
				Uruguay (Montevideo)	N/A				N/A		N/A				2012	B	F
				Paraguay (Asunción)	N/A				N/A		N/A				2012	B	F
				Bolivia (La Paz)	N/A				N/A		N/A				2010	B	F
			Intra Regional	Colombia (Bogota)	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2010	B	F
				Guyana (Georgetown)	N/A				N/A		N/A				2012	B	F
				French Guiana (Cayenne)	N/A				N/A		N/A				2012	B	F
				Argentina (Ezeiza)	64k				IPv4		Static				2010	D	D
				Bolivia (La Paz)	N/A				N/A		N/A				2012	B	F
				Venezuela (Caracas)	N/A				N/A		N/A					C	F
				Peru (Lima)	N/A				N/A		N/A				2010	B	F
				Suriname (Paramaribo)	N/A				N/A		N/A				2011	B	F
	Recife	IP	Intra Regional	French Guiana (Cayenne)	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II		B	E
				Uruguay (Montevideo)	N/A				N/A		N/A					B	F
			Inter Regional	AFI (Dakar)	N/A	TBD	FDMA FR	TBD	N/A	IPv6	N/A	TBD	CAFSAT	CAFSAT	TBD	B	E
				EUR (Canarias)												A	D

A	AFTN
B	AFTN + ATS speech
C	AFTN + ATS speech + radar
D	AMHS
E	AMHS + AIDC + teleconference
F	AMHS + AIDC + teleconference + radar

Administration and location		Type of router	Type of interconnection	Connected router	Link rate		Link Protocol						Via		Target date	Remarks	
							Physical layer - link		IP version		Routing protocol						
Admin.	Location				Current	Future	Current	Future	Current	Future	Current	Future	Current	Future		Current	Future
1		2	3	4	5		6							7	8	9	
Chile	Santiago	IP	Inter Regional	PAC (Christchurch)	N/A	TBD	N/A	N/A	N/A	IPv6	N/A	BGP4	PTT	PTT	TBD	A	D
			Intra Regional	Argentina (Ezeiza)	N/A		TDMA FR + ISDN	TBD	N/A	IPv4	N/A		REDDIG	REDDIG II	2010	B	F
				Bolivia (La Paz)	N/A				N/A		N/A					B	F
				Peru (Lima)	N/A				N/A		N/A				2010	B	F
Colombia	Bogota	IP	Inter Regional	NAM (Atlanta)	N/A	TBD	TDMA FR	TBD	N/A	IPv6	N/A	TBD	MEVA II	MEVA II	2010	A	D
				ACC Kigston	N/A				N/A		N/A					B	F
				ACC Curacao	N/A				N/A		N/A					B	F
				ACC Cenamer	N/A				N/A		N/A					B	F
				Panama (Panama)	N/A				N/A		N/A					B	F
		IP	Intra Regional	Ecuador (Guayaquil)	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2011	B	F
				Brazil (Manaus)	N/A				N/A		N/A				2010	B	F
				Peru (Lima)	N/A				N/A		N/A				2010	B	F
				Venezuela (Caracas)	N/A				N/A		N/A				2011	B	F
Ecuador	Guayaquil	IP	Intra Regional	Colombia (Bogota)	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2011	B	F
				Peru (Lima)	N/A				N/A		N/A				2011	B	F
			Inter Regional	ACC Cenamer	N/A	TBD	TDMA FR	TBD	N/A	IPv6	N/A	TBD	MEVA II	MEVA II		B	F

A	AFTN
B	AFTN + ATS speech
C	AFTN + ATS speech + radar
D	AMHS
E	AMHS + AIDC + teleconference
F	AMHS + AIDC + teleconference + radar

Administration and location		Type of router	Type of interconnection	Connected router	Link rate		Link Protocol						Via		Target date	Remarks	
							Physical layer - link		IP version		Routing protocol						
Admin.	Location				Current	Future	Current	Future	Current	Future	Current	Future	Current	Future		Current	Future
1		2	3	4	5		6							7	8	9	
French Guiana	Cayenne	IP	Inter Regional	ACC Dakar	N/A	TBD	TBD	TBD	N/A	IPv6	N/A	TBD	TBD	TBD		B	F
				ACC Piarco	N/A	TBD	TDMA FR + ISDN	TBD	N/A		N/A	BGP4	REDDIG	REDDIG II		B	F
			Intra Regional	Brazil (Recife)	N/A				N/A	IPv4	N/A					B	F
				Brazil (Manaus)	N/A				N/A		N/A				2012	B	F
				Suriname (Paramaribo)	N/A				N/A		N/A				2012	B	F
Guyana	Georgetown	IP	Inter Regional	ACC Piarco	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	TBD	MEVA II	REDDIG II	2012	B	F
		IP	Intra Regional	Brazil (Manaus)	N/A	TBD		TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2012	B	F
				Suriname (Paramaribo)	N/A				N/A	IPv4	N/A				2012	B	F
				Venezuela (Caracas)	N/A				N/A	IPv4	N/A				2012	B	F
Panama	Panama	IP	Intra Regional	Colombia (Bogota)	N/A	TBD	TDMA FR	TBD	N/A	IPv4	N/A	TBD	MEVA II	MEVA II		B	F
			Inter Regional	ACC Cenamer	N/A				N/A		N/A					B	F
				ACC Kigston	N/A				N/A		N/A					B	F
Paraguay	Asunción	IP	Intra Regional	Argentina (Ezeiza)	64K	TBD	TDMA FR + ISDN	TBD	IPv4	IPv4	Static	BGP4	REDDIG	REDDIG II	2009	B	F
				Bolivia (La Paz)	N/A				N/A		N/A					B	F
				Brazil (Curitiba)	N/A				N/A		N/A				2010	B	F

A	AFTN
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D	AMHS
E	AMHS + AIDC + teleconference
F	AMHS + AIDC + teleconference + radar

Administration and location		Type of router	Type of interconnection	Connected router	Link rate		Link Protocol						Via		Target date	Remarks	
							Physical layer - link		IP version		Routing protocol						
Admin.	Location				Current	Future	Current	Future	Current	Future	Current	Future	Current	Future		Current	Future
1		2	3	4	5		6							7	8	9	
Peru	Lima	IP	Intra Regional	Bolivia (La Paz)	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2012	B	F
				Brazil (Manaus)	N/A				N/A	IPv4	N/A				2010	B	F
				Chile (Santiago)	N/A				N/A	IPv4	N/A				2010	B	F
				Colombia (Bogota)	N/A				N/A	IPv4	N/A				2010	B	F
				Ecuador (Guayaquil	N/A				N/A	IPv4	N/A				2011	B	F
Suriname	Paramaribo	IP	Intra Regional	Brazil (Manaus)	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II	2012	B	F
				French Guiana (Cayenne)	N/A				N/A		N/A					B	F
				Guyana (Georgetown)	N/A				N/A		N/A					B	F
			Inter Regional	ACC Piarco	N/A	TBD	TDMA FR	TBD	N/A	IPv6	N/A	TBD	MEVA II	MEVA II		B	F
Trinidad and Tobago	Piarco	IP	Intra Regional	French Guiana (Cayenne)	N/A	TBD	TDMA FR + ISDN		N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II		B	F
				Guyana (Georgetown)	N/A				N/A		N/A					B	F
				Venezuela (Caracas)	N/A				N/A		N/A					B	F
				Suriname (Paramaribo)	N/A				N/A		N/A					B	F
			Inter Regional	ACC San Juan	N/A	TBD	TDMA FR		N/A	IPv6	N/A	TBD	MEVA II	MEVA II		B	F

A	AFTN
B	AFTN + ATS speech
C	AFTN + ATS speech + radar
D	AMHS
E	AMHS + AIDC + teleconference
F	AMHS + AIDC + teleconference + radar

Administration and location		Type of router	Type of interconnection	Connected router	Link rate		Link Protocol						Via		Target date	Remarks	
							Physical layer - link		IP version		Routing protocol						
Admin.	Location				Current	Future	Current	Future	Current	Future	Current	Future	Current	Future		Current	Future
1		2	3	4	5		6							7	8	9	
Uruguay	Montevideo	IP	Intra Regional	Argentina (Ezeiza)	64K	TBD	TDMA FR + ISDN	TBD	IPv4	IPv4	Static	BGP4	REDDIG	REDDIG II	2011	C	F
				Brazil (Recife)	N/A				N/A		N/A					B	E
				Brazil (Brasilia)	N/A				N/A		N/A				2012	B	F
Venezuela	Maiquetía	IP	Inter Regional	EUR (Madrid)	N/A	TBD	TBD	TBD	N/A	IPv6	N/A	TBD	PTT	PTT	TBD	A	D
				ACC San Juan	N/A	TBD	TDMA FR	TBD	N/A	IPv6	N/A	TBD	MEVA II	MEVA II		B	F
				ACC Curacao	N/A				N/A		N/A					B	F
				ACC Piarco	N/A	TBD	TDMA FR + ISDN	TBD	N/A	IPv4	N/A	BGP4	REDDIG	REDDIG II		B	F
			Intra Regional	Brazil (Manaus)	N/A				N/A		N/A				2011	C	F
				Colombia (Bogota)	N/A				N/A		N/A				2011	B	F
				Guyana (Georgetown)	N/A				N/A		N/A				2012	B	F

A	AFTN
B	AFTN + ATS speech
C	AFTN + ATS speech + radar
D	AMHS
E	AMHS + AIDC + teleconference
F	AMHS + AIDC + teleconference + radar

Chapter 3 – Definition and Cost of a REDDIG II Satellite Structure Model

1. General

1.1 Satellite communications are the ideal solution for the interconnection of geographically distant sites. Currently, the market offers many technological solutions for these communications, with equipment developed by different manufacturers for different applications.

1.2 It is important to note that, in terms of satellite transmission, the main problem is recurrent monthly costs (OPEX). Also important are matters related to coding and compression, modulation used, and the medium access technique, such as: Time-division multiple access (TDMA), frequency-division multiple access (FDMA) or code-division multiple access (CDMA).

1.3 The REDDIG is a VSAT network made up by sixteen nodes in fourteen countries, with a space segment leased to INTELSAT. The network operates full-meshed, with two management and control centres, the main one being installed in Manaus (Brazil) and the alternate in Ezeiza (Argentina).

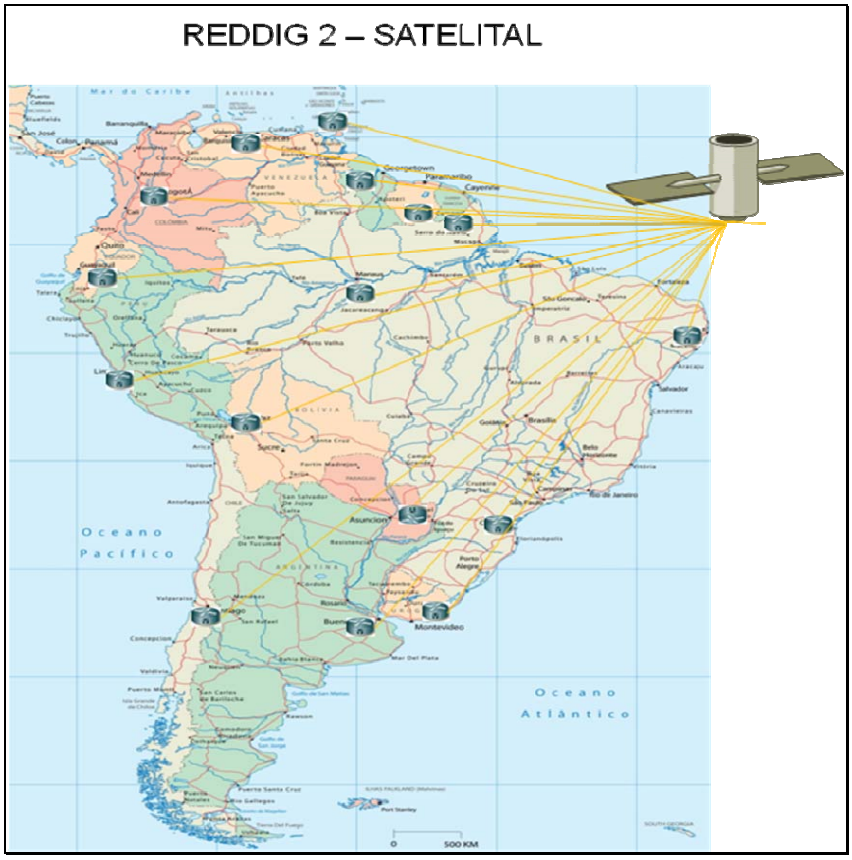


Figure 3-1: REDDIG satellite scheme

2. Spectral efficiency

2.1 The REDDIG uses the TDMA medium access method and the Frame Relay layer 2 protocol. It uses two 1,25 Msym/s-carriers, which means a space segment occupation of 1,75 MHz for each, and a smaller one of 0,625 Msym/s, consuming 0,875 MHz. Thus, total utilisation of the space segment is 4,38 MHz.

2.2 Another very important aspect is that the modulation used by the REDDIG is QPSK; which means that it transmits *two bits of information for each symbol*.

2.3 Since the transmission channel can distort and cause information errors, an Error Correction Code is applied, which, in the case of the REDDIG is VITERBI ½, which means that, of every 2 bits transmitted, only *one corresponds to information and the other is used as redundancy for error detection and correction.*

2.4 The 8-PSK is currently used in modern modulation techniques for satellite transmission, which means that 3 bits are sent for each symbol. Likewise, error correction techniques have evolved and modern systems use Turbo-Coding 7/8, where *one redundancy bit is used for every seven bits of useful information*. Therefore, it is felt that a change in the REDDIG satellite platform will significantly improve spectral efficiency.

3. Medium access technology

3.1 Regarding the medium access technology to be used, the experience of the Brazilian Administration indicates that it should not be restricted to a specific medium access technology, modulation, error correction code, etc.; the focus should be on the services instead of selecting a specific platform, as long as the basic principle illustrated in the *¨Introduction Chapter, Figure 1: Basic ATN-REDDIG II Scheme - Services¨* is followed.

4. Cost

4.1 The required services can be obtained in different ways, which are analysed below:

4.1.1 Option 1 (current): Leasing of the space segment and management by States, with/without participation of the ICAO Technical Cooperation

4.1.1.1 In terms of investment for the acquisition of the satellite equipment, the FOB costs quoted by various manufacturers to the Brazilian Administration for replacing the TELESAT satellite platform were used as a reference.

4.1.1.2 The most reliable figures suggest an average investment of USD 130,000.00 for each Brazilian TELESAT node. However, the values consider that the Brazilian satellite system is redundant with the land medium, which is the main medium. Thus, the equipment does not have fully duplicated chains.

4.1.1.3 The investment for the REDDIG (which provides an availability of 99,998%) is estimated in *USD 250,000.00 per node*, which is equivalent to a total cost of USD 4,000,000.00 for the sixteen REDDIG nodes. This value includes the two routers required by State. Of course, the values for the REDDIG II will need to be quoted subsequently in the preliminary phase of the project.

4.1.1.4 Table 3-1 summarises the estimated costs for the implementation of the REDDIG II, where both recurrent and non-recurrent charges are considered, with updated partial values:

Satelital			
NRC (Non Recurring Charges)	Valor (USD)	ARC (Annual Recurring Charges)	Valor (USD)
Estaciones Terrenas Completas	4.000.000,00	Repuestos	50.000,00
		Segmento Espacial	227.500,00
		Administrador de la REDDIG	240.000,00
Total	4.000.000,00		517.500,00

Table 3-1: Summary of satellite implementation costs

4.1.1.5 It should be noted that the value for ground stations includes the two routes required by State (USD 20,000.00 each, USD 40,000.00 per earth station).

4.1.2 Option 2: Service contract

4.1.2.1 Another way of providing satellite services is through a service contract, as is the case of the SES service provider for the members of MEVA II, which is the communication network of the CAR Region, which uses the same technology as the REDDIG.

4.1.2.2 Table 3-2 shows the costs of a hypothetical contract with the service provider (SES) for the REDDIG. These costs were derived from the values presented by the company in 2006, based on a cost comparison between the REDDIG (under Regional Cooperation Project RLA 03/901) and the budget submitted by the US company for the services being provided at the time when the interconnection of the two communication networks (MEVA II and REDDIG) was agreed upon.

4.1.2.3 The values are expressed in US dollars and the company proposed to aggregate the REDDIG to MEVA II; prices are considered to be reasonable by comparison. SES charges by number and types of circuits charged, based on which the REDDIG requirements (current circuits) were quantified and quoted.

Nó	PAMA	DAMA	AFTN	RADAR	GNSS	GERÊNCIA	PAMA	DAMA	AFTN	RADAR	GNSS	GERÊNCIA	TOTAL	ANUAL
SAEZ	5	7	9	2	1	1	540,00	826,00	2.205,00	490,00	245,00	1.080,48	5.386,48	64.637,76
SBCT	3	7	4	0	1	1	324,00	826,00	980,00	0,00	245,00	1.080,48	3.455,48	41.465,76
SBMN	5	7	5	1	0	1	540,00	826,00	1.225,00	245,00	0,00	1.080,48	3.916,48	46.997,76
SBRF	0	8	1	0	0	1	0,00	944,00	245,00	0,00	0,00	1.080,48	2.269,48	27.233,76
SCEL	2	6	2	0	1	1	216,00	708,00	490,00	0,00	245,00	1.080,48	2.739,48	32.873,76
SEGU	2	10	3	0	0	1	216,00	1.180,00	735,00	0,00	0,00	1.080,48	3.211,48	38.537,76
SGAS	1	5	4	0	0	1	108,00	590,00	980,00	0,00	0,00	1.080,48	2.758,48	33.101,76
SKED	8	9	10	0	0	1	864,00	1.062,00	2.450,00	0,00	0,00	1.080,48	5.456,48	65.477,76
SLLP	2	6	5	0	0	1	216,00	708,00	1.225,00	0,00	0,00	1.080,48	3.229,48	38.753,76
SMPM	1	5	3	0	0	1	108,00	590,00	735,00	0,00	0,00	1.080,48	2.513,48	30.161,76
SOCA	1	4	2	0	0	1	108,00	472,00	490,00	0,00	0,00	1.080,48	2.150,48	25.805,76
SPIM	4	8	9	0	0	1	432,00	944,00	2.205,00	0,00	0,00	1.080,48	4.661,48	55.937,76
SUMU	5	5	2	3	0	1	540,00	590,00	490,00	735,00	0,00	1.080,48	3.435,48	41.225,76
SVMI	7	4	11	0	0	1	756,00	472,00	2.695,00	0,00	0,00	1.080,48	5.003,48	60.041,76
SYGC	1	5	4	0	0	1	108,00	590,00	980,00	0,00	0,00	1.080,48	2.758,48	33.101,76
TTZP	4	2	2	0	0	1	432,00	236,00	490,00	0,00	0,00	1.080,48	2.238,48	26.861,76
TOTAL	51	98	76	6	3	16	5.508,00	11.564,00	18.620,00	1.470,00	735,00	17.287,68	55.184,68	662.216,16

Table 3-2: SES costs for the REDDIG

4.1.3 Comparison of Options 1 and 2

4.1.3.1 For comparison purposes, the provision of satellite services takes into account the number and type of circuits charged.

4.1.3.2 *It is also assumed that, in both modalities, the States are responsible for purchasing the equipment for earth stations.* That is, the quote of USD 250,000.00 of SES for a station with duplicated chains is the same as for the REDDIG.

4.1.3.3 Table 3-3 shows a summary of REDDIG costs obtained from the final report of the RCC/13 meeting. Column 2009 shows the cost charged to all nodes, a total of *USD 676,000.00*.

4.1.3.4 It should be noted that this total value includes a significant growth in spare parts due to obsolescence and discontinuation of the main equipment of the REDDIG.

4.1.3.5 A simple analysis leads to the initial conclusion that hiring services is more advantageous than managing and controlling the REDDIG, as is done today.

4.1.3.6 However, the REDDIG uses 73,5% of the hired space segment. In case of a 100% utilisation, the value of USD 662,216.16 presented by SES would increase to an average value of **USD 837,000.00.**

Desglose detallado de gastos al 31 de diciembre de 2009

Rubro	2003	2004	2005	2006	2007	2008	2009	TOTAL
BL 11 Expertos								
Administrador REDDIG	22.359	87.650	101.296	157.561	197.784	177.449	207.289	951.388
Experto CNS						1.504		1.504
BL 13 Apoyo Adm.								0
13-01 Secretaría	354	12.185	12.551	0	15.718	18.988	14.069	73.865
13-02 Técnico REDDIG		12.000	12.108	712	250		2.080	27.150
BL 15 Viajes Oficiales		321	925	499				1.745
BL 16 Misiones	3.504	4.110	16.733	18.642	18.357	25.718	11.789	98.853
BL 20 Sub-Contratos								0
21-01 PanAmSat (1 Oct -31 Dic 2003) P.O. 30473	62.727							62.727
21-01 PanAmSat (2004) P.O. 40670		168.849	231.264	231.264	231.264	231.264	231.264	1.325.169
21-98 Seguro Responsabilidad Profesional		845	1.156	3.469			1.156	6.626
BL 39 Capacitación		3.014	53.862	30.553	34.044	32.852	31.084	185.409
BL 40 Equipo								0
45-01 Repuestos		-12.752	59.542	36.312	71.637	34.758	122.925	312.422
45-02 Equipo para Oficina	82		2.083	-30	0			2.135
45.03 Operación y mantenimiento de equipo		1.716	1.781		0			3.497
45.04 Traslado del NCC de SPIM a SBMN								0
PO 40694 VIASAT		8.250						8.250
PO 40687 MEMOTEC		4.250						4.250
45.05 PO 40489 Extensión contrato SEEE		50.000						50.000
45.06 PO 40090 Red de Back-up SEEE		24.820						24.820
45.98 Seguro de responsabilidad profesional(PLI)		444	284	246			1.092	2.066
BL 53.01 Tel., Gastos Bancarios, courier, etc.	643	4.726	4.475	1.150	8.688	5.918	3.016	28.616
BL 53.02 Gastos por Servicios del PNUD		118	505	337	0			960
55.01 Costos Administrativos AOSC	6.439	28.795	35.817	34.695	34.601	33.188	50.897	224.432
TOTAL	96.108	399.341	534.382	515.410	612.343	561.639	676.661	**3.395.884**

Table 3-3: Annual costs of the REDDIG

4.1.3.7 On the other hand, for a proper comparison, the values for spare parts and training for the maintenance of the REDDIG nodes must be eliminated from column 2009 of Table 3-1, giving a corrected value of **USD 522,652.00** for Option 1. The resulting annual difference, **USD 314.348**, *is in favour of the current mode*.

4.1.3.8 *Accordingly, the current operational option is clearly more advantageous.*

4.1.4 Option 3: Leasing of earth stations and hiring of services

4.1.4.1 SES offers another way of providing satellite services to its customers, through hired services and the leasing of earth stations. Even in the absence of a direct quote from the provider of said stations, 2006 values were considered for the equipment and the cards that would need to be installed in the REDDIG and MEVA II nodes involved in the interconnection.

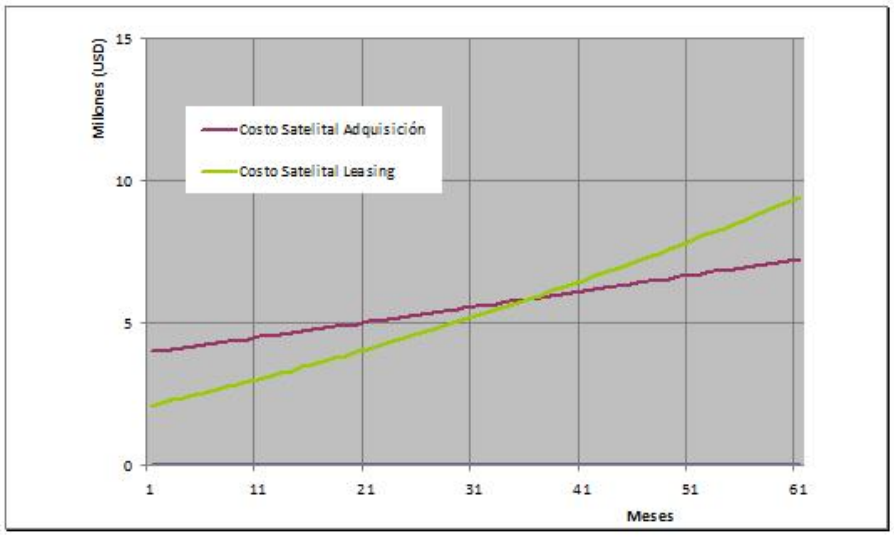
4.1.4.2 The SES quote assumed that the State would be able to purchase the equipment after a period of 5 years of contract, at the symbolic price of USD 1.00. However, it was noted that all the offers included an interest rate of 1.6% per month for *half the total value of the equipment*, since the leasing contract presupposed *a payment of 50% of the total value on the first month*.

4.1.4.3 Accordingly, the *application* of the model to the acquisition of earth stations through a leasing contract results in the costs shown in Table 3.4.

Red Satelital Leasing			
NRC (Non Recurring Charges)	Valor	ARC (Annual Recurring Charges)	Valor
Estaciones Terrenas Complestas	2.000.000,00	Servicios	662.216,16
		Leasing	400.000,00
Total	2.000.000,00		1.062.216,16

Table 3.4: Cost of a satellite network with leased earth station services

4.1.4.4 Another way of comparing costs is shown in Graph 3-1, which reflects the cost of hiring services under the equipment leasing modality, compared to the current REDDIG model, with the purchase of new equipment and the hiring of the space segment. Since the States have the possibility of buying the equipment after 5 years, the comparative time space is limited to 60 months.



Graph 3.1: Satellite network with leased services - Current REDDIG model

5. Conclusion

5.1 Studies show that the current method of managing and controlling the satellite network and hiring the space segment represents a clear advantage for SAM States, compared to the modality of hiring the services from a provider, either through leasing or through the purchase of the ground equipment.

Chapter 4 – Definition and Cost of a REDDIG Ground Structure Model

1. Original requirement

1.1 During the thirteenth Technical Cooperation Meeting of the REDDIG (RCC/13), held at the ICAO Regional Office in Lima-Peru, on 9-10 March 2010, an *ad-hoc* group was established with the participation of delegates of Argentina, Brazil and Peru with the purpose of beginning studies for changing the REDDIG platform. The results are shown in Appendix D to Agenda Item 2, which are transcribed as Table 4-1 below:

ESTUDIOS PRELIMINARES A REALIZAR PARA EL CAMBIO DE LA PLATAFORMA TECNOLOGICA DE LA REDDIG

(Información elaborada por el Grupo ad Hoc conformado por Argentina, Brasil y Perú)

1.1 Para el estudio se tuvieron en cuenta los siguientes criterios:

- 1.1.1. Disponibilidad.
- 1.1.2. BER
- 1.1.3. Ancho de Banda (BW).
- 1.1.4. Tecnología actual (equipamiento instalado).
- 1.1.5. Tipos de servicios a ser implementados.
- 1.1.6. Proveedor de telecomunicaciones único.

1.2 Considerando los criterios determinados anteriormente se propone:

- 1.2.1. Caso 1:
  - 1.2.1.1. Analizar una red terrestre principal para las aplicaciones actuales y ATN y los anchos de bandas necesarios.
  - 1.2.1.2. Analizar una red satelital de backup para casos de contingencia.
- 1.2.2. Caso 2:
  - 1.2.2.1. Analizar una red satelital principal para las aplicaciones actuales y ATN y los anchos de bandas necesarios.
  - 1.2.2.2. Analizar una red de backup para casos de contingencia.
- 1.2.3. Determinar el equipamiento apropiado.
- 1.2.4. Realizar estudios de costo beneficio para cada una de las soluciones propuestas.
- 1.2.5. La solución definitiva (cambio progresivo o completo) será analizada luego de disponer de los costos asociados para poder estudiar el impacto en cada una de ellas.

Table 4-1: Document of the *ad-hoc* Group

1.2 Initially, the idea was to follow the criteria listed in item 1.1. Based on a simple analysis of criteria, it may be concluded that the quotes for ground circuits would be requested for "clear channel" circuits, that is, those that are dedicated and seamless to the protocol.

1.3 It was assumed that this type of circuit isolated the user completely from the ground provider, and ensured that the hired bandwidth was at its full disposal.

1.4 Furthermore, the States would purchase the terminal equipment for multiplexing and routing the services provided by the service provider and entering the equipment of the physical layer (layer 1). Likewise, it was noted that services would be offered by a single company to facilitate maintenance (to avoid proliferation of problems when a complaint must be filed regarding the failure or degradation in the quality of the services).

2. Market offerings

2.1 For this activity, the proposals and quotes submitted by *Telefónica S.A*, *Global Crossing Latin America* and *Empresa Brazileira de Telecomunicaciones* (EMBRATEL) were taken into account. It should be noted that the Administration of Argentina provided the *Telefónica* quote, while the Brazilian Administration provided the other two.

2.2 All of the companies submitted their proposals with circuit availability variations, mentioning the services covered, such as network management and control, and the speed associated to the communication channels. However, *the three companies presented the IP/MPLS* solution as the most feasible for implementation, taking into account network coverage, which many times has the last mile provided by third parties under contract.

2.3 In this sense, other matters should be taken into account for the adoption of the proposed solution, which differs from that stated in paragraph 1.1 of the study conducted by the RCC-13 *ad-hoc* group. Consequently, some important aspects related to MPLS are presented below.

3. MPLS technology

3.1 MPLS is a label-based packet routing technology that, in essence, works with the addition of labels by given routers of the network. The MPLS is indifferent to the types of data transmitted, which can be traffic using the IP (Internet Protocol) or other types of protocol at the entrance of the backbone. From there on, all the routing is based on those added labels.

3.2 Compared with IP routing, MPLS is more efficient since the routing tables for all network assets no longer need to be consulted. Furthermore, its flexibility permits the transmission of messages independently from the stack of protocols used in the upper layers.

3.3 MPLS permits the creation of VPN (Virtual Private Networks), ensuring full isolation of traffic through the creation of label tables that are exclusive for each VPN. It is also possible to do QoS (quality of service) prioritising critical applications, giving differential treatment to traffic between the various points of the VPN. The QoS creates the necessary conditions for a better use of network resources, also enabling the traffic of voice and video applications and other continuous applications in real time.

3.4 Figure 4-1 illustrates packet transmission in a traditional IP network.

3.5 As may be noted in this figure, the routing table is consulted in all the routers, which consumes processing resources and causes a greater delay in the transmission of information.

3.6 This is due to the fact that headers are deleted in each router up to level 3 of the ISO (*International Organization for Standardization*) OSI (*Open Systems Interconnection*) layer.

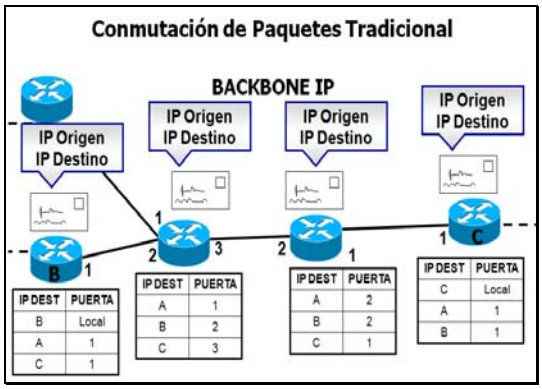


Figure 4-1: IP Switching

3.7 Figure 4-2 shows that packet routing using MPLS is accomplished through a label table, thus eliminating the need to delete packet headers up to OSI level 3. MPLS operates in an intermediate layer in relation to the traditional definitions of layer 2 (link) and layer 3 (network), reason why it was called layer 2.5 protocol.

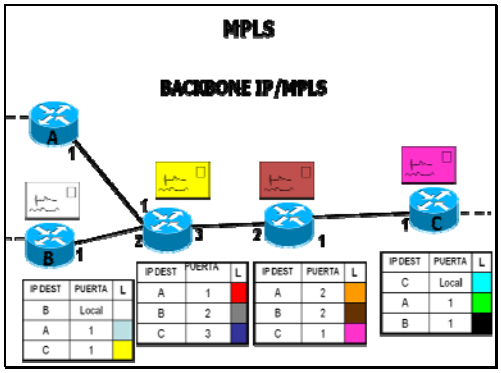


Figure 4-2: MPLS Switching

3.8 In order to achieve complete success in MPLS contracts, it is necessary to establish characteristics in the SLAs *(Service Level Agreements)* to ensure the creation of the VPN using the MPLS, in keeping with RFC 2547 and RFC 3031, and enable QoS configuration over MPLS/VPN, as provided for in RFC 3270 and RFC 2938.

3.9 According to the required SLA priorities and levels, the various types of packets that will circulate through the network will be classified in at least five types of service, following thRFC 2474 and 2475 (*DiffServ*) patterns, supplemented by RFC 2597 (*Assured Forwarding PHB*) and RFC 2598 (*Expedited Forwarding*).

3.10 An example of classification that might be used for QoS configuration follows.

3.10.1 *Real time:* Delay- and jitter-sensitive applications, which require packet prioritising and band reservation.

3.10.2 *Critical mission*: Critical interactive applications for the transmission of critical operational information that requires guaranteed delivery and priority treatment.

3.10.3 *Management*: Network management applications using ICMP, SNMP, Telnet, and other protocols.

3.10.4 *Non-critical:* Applications with messages of varying size that do not require immediate attention by users. Even if the contents may be important, these applications may wait until network resources are available.

3.10.5 *Standard*: All the traffic that is not explicitly assigned to the aforementioned classes will be classified as standard or ¨*best-effort*¨. This type of traffic may be transmitted if network resources are available, but should not have a negative impact on the other classes.

4. Proposed MPLS network topology

4.1 Figure 4-3 shows a map illustrating an IP/MPLS network topology in each of the existing REDDIG nodes.

Figure 4-3: Ground Network Model

5. Cost of the MPLS service for the REDDIG II

5.1 With respect to comparative costs of the three aforementioned telecommunication providers, it may be stated that the most advantageous offer in terms of cost-benefit ratio is the one from *Telefónica*. The presence of *Telefónica* in the SAM States is illustrated in Figure 4-4 below, which shows its penetration in most of South America.

Figure 4-4: Current Presence of *Telefónica* in South America

5.2 The main points of the offer from *Telefónica* are listed below:

5.2.1 Availability/link: 99,5% in average.

5.2.2 Transmission rate: 256 kbps.

5.2.3 Monthly cost of each link (average): USD 2,941.00.

5.2.4 Installation of equipment: USD 54.080 (total).

5.3 However, in order to make a proper assessment of the costs of *Telefónica* (with respect to REDDIG expenditure), an availability of 99,998% is required, which is equal to that expected with the existing satellite platform.

5.4 The study contemplated the installation of a second link per node, resulting in an availability increase to 99,9975%. It should be noted that the cost of the backup link normally tends to be higher, since the provider will have to establish another communication medium for the establishment of the last mile, or hire it from a third party.

5.5 Furthermore, the quote did not consider the cost of the routes in each node. Thus, considering an average cost of USD 20,000.00 per router for equipment redundancy, the investment is in the order of USD 40,000.00 for each REDDIG node.

5.6 Table 4-2 contains a summary of the prices of *Telefónica*, in US dollars:

5.6.1 Routers: USD (20,000.00 x 2 x 16), that is, two routers in each of the 16 nodes.

5.6.2 Installation: as proposed by *Telefónica*.

5.6.3 Spare parts: 10% per year of the cost of the routers (0.1 x 640,000.00).

5.6.4 Cost of MPLS: USD (2,941.00 x 2 x 16 x 12), that is, the unit monthly payment x 2 accesses x the number of nodes x 12 months.

Red Terrestre			
NRC (Non Recurring Charges)	Valor (USD)	ARC (Annual Recurring Charges)	Valor (USD)
Costo de Enrutadores	640.000,00	Repuestos	64.000,00
Instalación de Equipos Proveedor	54.080,00	Costo de MPLS (32 accesos)	1.129.344,00
Total	694.080,00		1.193.344,00

Table 4-2: Prices of the Ground Network

Chapter 5 - Comparative Study of Satellite and Ground REDDIG II Models and Costs

1. General

1.1 In the current structure of the REDDIG, the space segment is hired and said segment is managed and controlled by the REDDIG Administration. There is also a backup network made up by ISDN BRI circuits, whose technology is being discontinued by the service providers.

1.2 It is also a fact that the amount of space segment required is directly related to the technology used in earth stations and to the services supported, as stated above.

1.3 However, it should be noted that in the space segment hired, payment is based on the amount of bandwidth hired, whether or not the available capacity is used. Likewise, as already stated, the OPEX is a major problem in satellite communications.

1.4 Furthermore, when hiring ground services based on IP/MPLS, payment is made for the link between the client and the point of presence (PP) of the provider, and for the use of network (cloud) resources involving the QoS configuration of the applications. If network demand is sized consistently, services may be readily added to the hired network.

2. Availability and logistics

2.1 The concept of *availability* is very important in telecommunication networks. Two factors are involved when talking of availability: Mean Time Between Fail (MTBF) and Maximum Time to Repair (MTTR).

2.1.1 MTBF is more related to the quality of the equipment--which is directly related to the manufacturer--and to the health of the facilities (quality of electric power and grounding).

2.1.2 MTTR is related to the logistics available for maintenance and how fast the team in each State conducts such maintenance. Statistically, in case of failure, the shorter the time of unprotected operation of the redundant module while the main equipment is being maintained, the less likely it will be for the system to remain inoperative.

2.2 It should be noted that the REDDIG technicians have received (and continue to receive) proper training through a cyclic training programme, which provides for excellence in the services rendered.

2.3 Meantime, logistics *is a weak point in the process*. This is because the REDDIG lacks expeditious customs procedures for receiving and returning the parts to the ICAO Regional Office in Lima, where spare parts are kept for Project RLA03/901.

2.4 The RCC/9 meeting formulated Conclusion RCC 9/03 “Alternatives for improving spare part logistics for the REDDIG”, which contemplated a study for the creation of a REDDIG spare part warehouse under the free-zone modality, which in the end, did not occur. The practical result, as reflected in the RCC/10 report, is that the equipment import/export times are not as desired, in some cases, taking as much as *12 months*.

2.5 A solution might be the creation of the South American Air Navigation and Safety Organisation, one of whose functions would be to manage the REDDIG. An organisation in which all the States of the SAM Region participate *may* succeed in the development of mechanisms to facilitate and expedite the management of spare parts.

2.6 It may be concluded that the current availability of the REDDIG *could be seriously compromised* because of spare part logistics, and there seems to be no solution until the future regional organisation is created (without concrete implementation times).

3. Comparative costs

3.1 The costs associated to the ground and satellite modalities are compared in Tables 5-1 and 5-2, extracted from the respective chapters.

Red Terrestre			
NRC (Non Recurring Charges)	Valor (USD)	ARC (Annual Recurring Charges)	Valor (USD)
Costo de Enrutadores	640.000,00	Repuestos	64.000,00
Instalación de Equipos Proveedor	54.080,00	Costo de MPLS (32 accesos)	1.129.344,00
Total	694.080,00		1.193.344,00

Table 5-1: Cost of the ground solution

3.2 It should be noted that, for the satellite solution, the REDDIG will use more efficient equipment in terms of modulation and error correction codes, resulting in bandwidth optimisation in the order of 30%, as shown in Table 5-2.

Satelital			
NRC (Non Recurring Charges)	Valor (USD)	ARC (Annual Recurring Charges)	Valor (USD)
Estaciones Terrenas Completas	4.000.000,00	Repuestos	50.000,00
		Segmento Espacial	227.500,00
		Administrador de la REDDIG	240.000,00
Total	4.000.000,00		517.500,00

Table 5-2: Cost of the satellite solution

3.3 This comparison should be done through time, since recurrent and non-recurrent charges differ, as shown in Table 5-3:

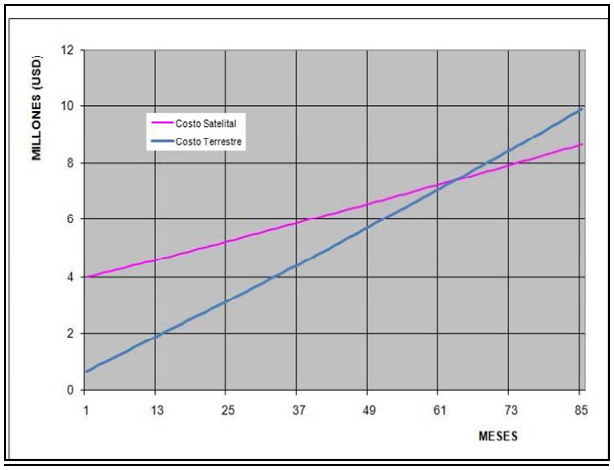


Table 5-3: Comparison of satellite and ground costs through time

3.4 For comparison purposes in the table, a period of seven (7) years was considered--the estimated period currently contemplated for technological changes--, since the old ten-year rule is now obsolete given the fast pace of technological change. An interest rate of 0.2% per month was considered, which represents an annual rate of 2.4% (which reflects the FED in the last 8 years).

3.5 As may be seen in the table, *after five years, ground costs are higher than satellite costs.*

4. Conclusions

4.1 From the *economic* point of view, the final costs at the end of seven years favour the *satellite* solution.

4.2 From the *technical-operational* point of view, it must be recognised that all the States have skilled personnel to support their respective stations; thus, the *satellite* solution seems to be the most logical one.

4.3 As to the *availability associated to logistics*, it is felt that the *ground* solution is the most appropriate due to the uncertainty (or potential hazard) involved in the satellite solution.

Chapter 6 - Analysis of the Mixed Model and Proposal of a Final Infrastructure

1. Mixed model

1.1 From the economic and technical-operational point of view, the satellite structure is advantageous to SAM States compared to a purely ground network. On the other hand, the hiring of a parallel ground network guarantees availability (in the first place) and offers a natural increase of such availability. Accordingly, a mixed network configuration, as shown below, could be applied until the South American Air Navigation and Safety Organisation is created.

2. Infrastructure

2.1 The infrastructure is based on the scheme shown in Figure 6-1:

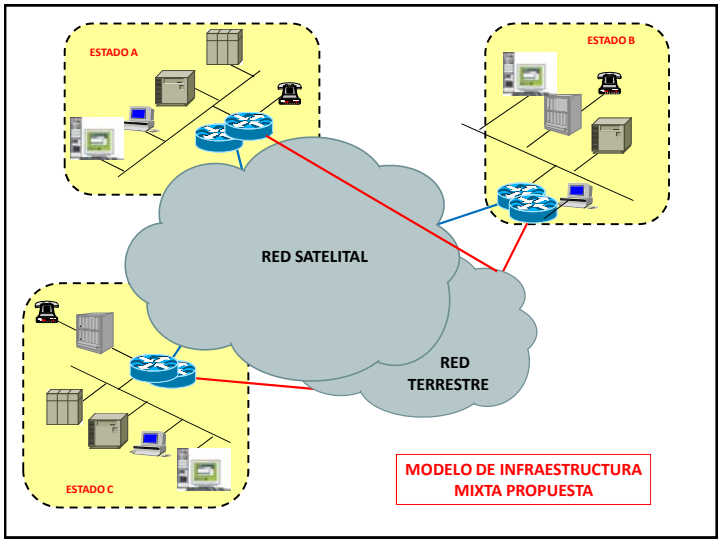


Figure 6-1 – Proposed infrastructure scheme

2.2 The aforementioned network would be a combination of a *main satellite network and a ground network*, which would increase network capacity, for the transmission of new ATN applications and, as already stated, to increase system availability.

2.3 To that end:

2.3.1 The satellite part would have duplicated chains to ensure high availability.

2.3.2 The ground part would have a chain, with the practical availability provided by most ground networks.

3. Availability

3.1 Table 6-1 shows the theoretical availability of the two systems, ground and satellite, in parallel, considering, for calculation purposes, an 8-year average MTBF and a 30-day MTTR. The table shows the significant improvement obtained in this aspect.

Disponibilidad Satélite			
D1	D2	Dparalelo	Descrição
99,900000%	99,900000%	99,999900%	Disponibilidad FRAD
99,900000%	99,900000%	99,999900%	Disponibilidad MODEM
99,900000%	99,900000%	99,999900%	Disponibilidad SSPA
	99,950000%	99,999000%	Disponibilidad Seg. espacial/año
Dsistema:		99,989700%	

Disponibilidad Terrestre			
D1	D2	Dparalelo	Descrição
	99,500000%	99,500000%	Equipo de Capa 1
Dsistema:		99,500000%	

Disponibilidad de dos sistemas e paralelo:	99,9999485002%
Indisponibilidad en minutos por mes:	0,02

Table 6-1: Availability

3.2 It is important to highlight that, under the present circumstances, *there is the potential for the REDDIG availability to be seriously compromised*, as already discussed extensively in the previous chapter. This single reason would warrant a mixed system.

4. Cost

4.1 For the adoption of the mixed solution, consideration has been given to a main satellite network with duplicated chains, and a parallel ground backup network, the associated cost of which appear in Table 6-2.

4.2 Another form of mixed network includes a satellite network with a simple chain, which reduces the investment in equipment, as shown in Table 6.3.

4.3 In the proposed model, the cost difference between the mixed and the satellite network will be smaller the sooner the South American Air Navigation and Safety Organisation is created.

Red Mixta			
NRC (Non Recurrin Charges)	Valor	ARC (Annual Recurring Charges)	Valor
Estaciones Terrenas Completas	4.000.000,00	Segmento Espacial	227.500,00
Instalación Equipos Proveedor	54.080,00	Administrador de la REDDIG	240.000,00
		MPLS (16 accesos)	564.672,00
		Repuestos	50.000,00
Total	4.054.080,00		1.082.172,00

Table 6-2: Cost of the mixed network with duplicated satellite chain

Red Mixta (Cadena Satelital Simple)			
NRC (Non Recurrin Charges)	Valor	ARC (Annual Recurring Charges)	Valor
Estaciones Terrenas Completas	2.000.000,00	Segmento Espacial	227.500,00
Instalación Equipos Proveedor	54.080,00	Administrador de la REDDIG	240.000,00
		MPLS (16 accesos)	564.672,00
		Repuestos	25.000,00
Total	2.054.080,00		1.057.172,00

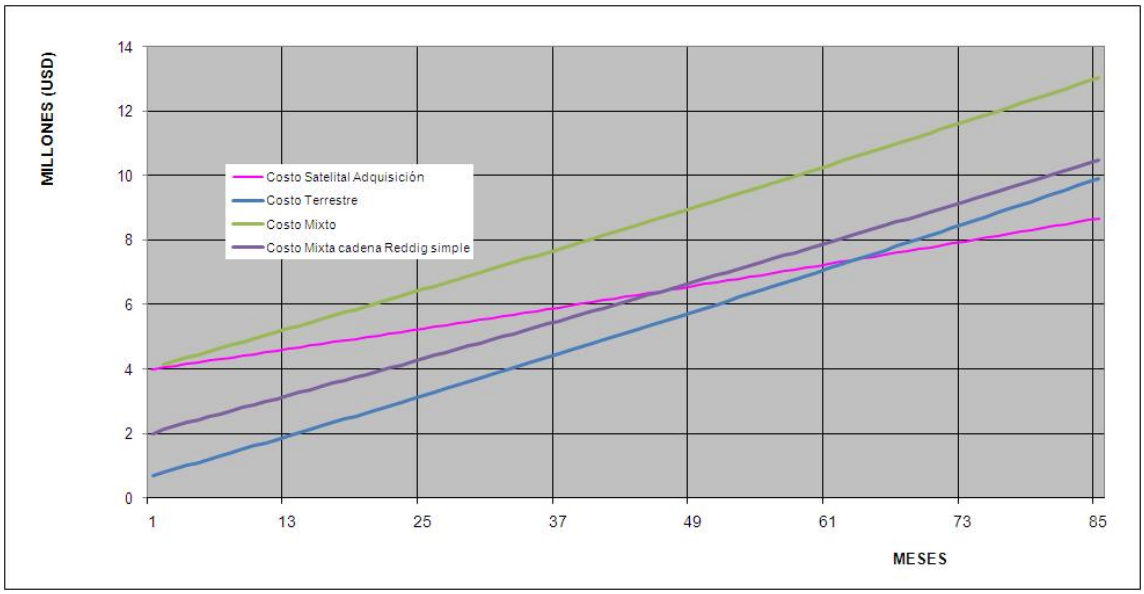
Table 6-2: Cost of the mixed network with duplicated satellite chain

4.4 The quote for the ground proposal assumed that all services would revolve around it, which resulted in a 256K access, with the indicated costs.

4.5 However, used as a redundant system, only critical services (those currently in operation) would have access and only half of the access bandwidth (128K) would be used, thus reducing recurrent costs by at least 2/3 of the indicated value (USD 376,448.00 per year, instead of USD 564,672.00). Thus, at the end of the seven years analysed, there would be a reduction of USD 1,317,568.00.

5. Comparison of the satellite, ground and mixed models

5.1 Graph 6-1 shows the associated costs of the four types of networks under study: satellite, ground, mixed (duplicated satellite chain) and mixed (single satellite chain).



Graph 6-1: Comparison of satellite, ground and mixed costs

5.2 It is obvious that the mixed solution with duplicated satellite chain is more expensive. However, it should be noted that:

5.2.1 The required availability is guaranteed, although the potential satellite availability risk will persist until a regional mechanism that ensures the normal mobilisation of spare parts is found.

5.2.2 The States may chose to have access to the redundant network, or stay linked only to the satellite network.

5.2.3 The leasing of 128K of ground access is considered sufficient *prima facie*, thus reducing total cost.

5.2.4 If the South American Air Navigation and Safety Organisation is created prior to the implementation of the mixed solution, it will not be necessary to hire the ground network. Likewise, the ground network service contract may be terminated if said Organisation is not created before implementing the mixed solution.

5.3 Table 6-3 contains a summary of all the numbers presented so far:

Partial cost of the mixed solution after seven years			
Item	**Satellite**	**Ground 1 (256K)**	**Ground 2 (256K)**
Earth stations	4,000,000.00		
Installation		54,080.00	54,080.00
Space segment	1,592,500.00		
REDDIG administration	1,680,000.00		
MPLS		3,952,704.00	2,635,136.00
Spare parts	350,000.00		
Total cost of the mixed solution after seven years			
Pure satellite	7,622,500.00		
Mixed 1 (Satellite + ground 1)		11,629,284.00	
Mixed 2 (Satellite + ground 2)			10,311,716.00
Differences	**Net**	**Percent**	
Mixed 1 - satellite	4,006,784.00	52.57%	
Mixed 2 - satellite	2,689,216.00	35.28%	

Table 6-3: Summary of costs

6. Implementation of services

6.1 A mixed network allows for a wide variety of configuration options. For example, Table 6-4 shows the applications that could be initially used in the ground portion of the mixed network, with the corresponding bandwidth consumption. In this case, *half* of the essential services of each node have been considered, which, for current applications, correspond to AFTN/AMHS, radar data and non-switched speech communications.

State	**Location**	**AFTN**			**Hot line**			**Radar**			**Partial**
		Circ.	**Vel.**	**BW**	**Circ.**	**Vel.**	**BW**	**Circ.**	**Vel.**	**BW**	
Argentina	Ezeiza	4	2.4	9.6	3	10.0	30.0	2	9.6	19.2	58.8
Bolivia	La Paz	2	2.4	4.8	1	10.0	10.0	0	9.6	0.0	14.8
Brazil	Curitiba	2	2.4	4.8	1	10.0	10.0	0	9.6	0.0	14.8
	Manaus	3	2.4	7.2	3	10.0	30.0	0	9.6	0.0	37.2
	Recife	1	2.4	2.4	0	10.0	0.0	0	9.6	0.0	2.4
Chile	Santiago	1	2.4	2.4	1	10.0	10.0	0	9.6	0.0	12.4
Colombia	Bogota	4	2.4	9.6	4	10.0	40.0	0	9.6	0.0	49.6
Ecuador	Guayaquil	2	2.4	4.8	1	10.0	10.0	0	9.6	0.0	14.8
French Guiana	Rochambeau	1	2.4	2.4	1	10.0	10.0	0	9.6	0.0	12.4
Guyana	Georgetown	2	2.4	4.8	1	10.0	10.0	0	9.6	0.0	14.8
Paraguay	Asunción	1	2.4	2.4	1	10.0	10.0	0	9.6	0.0	12.4
Peru	Lima	4	2.4	9.6	2	10.0	20.0	0	9.6	0.0	29.6

State	Location	AFTN			Hot line			Radar			Partial
		Circ.	Vel.	BW	Circ.	Vel.	BW	Circ.	Vel.	BW	
Surinam	Paramaribo	2	2.4	4.8	1	10.0	10.0	0	9.6	0.0	14.8
Trinidad y Tobago	Piarco	1	2.4	2.4	2	10.0	20.0	0	9.6	0.0	22.4
Uruguay	Montevideo	1	2.4	2.4	3	10.0	30.0	2	9.6	19.2	51.6
Venezuela	Maiquetía	5	2.4	12.0	2	10.0	20.0	0	9.6	0.0	32.0
Total bandwidth of the ground medium											**394.8**

Table 6-2: Example of ground applications of the mixed network

APPENDIX C

ACTION PLAN FOR THE IMPLEMENTATION OF A NEW DIGITAL NETWORK FOR THE SAM REGION (SAM ATN NETWORK)

ACTIVITIES	ACTION TO BE TAKEN BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
1 Identify current voice and data services requirements, as well as those scheduled to be implemented in the short, medium and long term in the SAM Region, in support of air navigation	SAM/IG Group for the implementation of CNS improvements	List of services requirements in support of air navigation for the SAM Region, including those scheduled for the short, medium and long term	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)
2 Analysis of band width required for the services identified in Activity 1	SAM/IG Group for the implementation of CNS improvements	Amount of band width required to support the requirements specified in Activity 1	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)
3 Determination of costs for the band width increase in REDDIG	SAM/IG Group for the implementation of CNS improvements	Implementation costs of new REDDIG services	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)
4 Study of the new REDDIG technological platform and determination of its cost	SAM/IG Group for the implementation of CNS improvements	Definition of the REDDIG technological platform	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)
5 Study of a ground SAM IP structure supporting the services required and defined in Activity 1, as well as of the band width requirements defined in Activity 2	SAM/IG Group for the implementation of CNS improvements	Definition of a SAM ground IP network model structure	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)

ACTIVITIES	ACTION TO BE TAKEN BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
6 Determination of costs for the implementation of Activity 5	SAM/IG Group for the implementation of CNS improvements	Implementation costs of SAM ground IP network structure	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)
7 Study on the structure of a mixed (ground and satellite) SAM digital network structure	SAM/IG Group for the implementation of CNS improvements	Model definition	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)
8 Determination of the costs for the implementation of Activity 7	SAM/IG Group for the implementation of CNS improvements	Implementation costs of a mixed (ground and satellite) digital network structure	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)
9 Comparisons between the network infrastructure models specified in Activities 4, 5 and 7	SAM/IG Group for the implementation of CNS improvements	Comparative study between the ground IP and mixed (satellite and ground) satellite network models	SAM/IG/5	Completed. Refer to study for the implementation of a new digital network in the SAM Region (Appendix B to this Agenda Item)
10 Determination of SAM network infrastructure model, on the basis of results of Activity 9	SAM/IG Group for the implementation of CNS improvements	Definition of a SAM network infrastructure model	SAM/IG/5	The model network infrastructure definition for the SAM Region, found in the study for the implementation of a new digital network for the SAM Region, will be circulated to States for its review. It is expected that by SAM/IG/7 meeting the network infrastructure model for the SAM Region will be defined upon
11 Holding of a seminar/workshop on new satellite and ground networks technology	Secretariat	Technological solutions for the new network configuration in the SAM Region	Mar 2011	

ACTIVITIES	ACTION TO BE TAKEN BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
12 Acceptance process for the implementation of the network infrastructure model determined by Activity 10, through a public bidding process	SAM/IG Group for the implementation of CNS improvements	Acceptance of the public bidding process for the implementation of a SAM network infrastructure	SAM/IG/5	
13 Preparation of technical specifications for the implementation of the SAM network infrastructure specified in Activity 10	SAM/IG Group for the implementation of CNS improvements	Technical specifications for the implementation of a SAM network infrastructure	SAM/IG/6	Experts will be hired for a 15-day period to draft the definite technical specifications
14 Presentation of technical specifications to a bidding process	SAM/IG Group for the implementation of CNS improvements	Public bidding process for the implementation of the SAM network structure	Dec 2011	
15 Evaluation of offers presented	SAM/IG Group for the implementation of CNS improvements	Assessment of offers	Mar 2012	
16 Determination of winning bidder	SAM/IG Group for the implementation of CNS improvements	Designation of winning bidder for the network implementation	Jun 2012	

Agenda Item 7: Operational implementation of new ATM automated systems and integration of the existing systems

Follow-up to the interconnection of automated systems

7.1 The Meeting took note of the progress made in the interconnection of the automated systems specified in the Memoranda of Understanding (MoU) drafted and signed during the First ATM/CNS Multilateral Meeting among Argentina, Brazil and Uruguay. In addition, during the Meeting, an MoU was agreed upon between Argentina-Chile and another MoU was signed between Brazil-Venezuela. Hereunder is information on the progress made in the implementation of the automated systems identified in the MoUs.

Interconnection of the automated systems between Argentina and Uruguay

7.2 The Meeting noted that the MoU between Argentina-Uruguay had been updated during the Second ATM/CNS Multilateral Meeting among Argentina, Bolivia, Brazil, Paraguay and Uruguay, held in Lima, Perú, from 9 to 12 August 2010, having signed an act in this regard.

7.3 The Meeting was informed that the act indicates that the Durazno (Uruguay) radar data will be available in Ezeiza (Argentina) in March 2011, and the AIDC service, by the last quarter of 2011. The Quilmes (Argentina) radar data is currently available in Montevideo.

Interconnection of the automated systems between Argentina and Brazil

7.4 In addition, the Meeting took note that the MoU signed between the administrations of Argentina and Brazil had not been modified. It establishes the interconnection of the automated systems at the Resistencia and Curitiba ACCs, carrying secondary radar information from Resistencia to the Curitiba ACC, and the Santiago and Foz do Iguacu radars, to the Resistencia ACC. The date for the interconnection of radar data and automatic flight plan hand-off is October 2011.

Interconnection of the automated systems between Brazil and Uruguay

7.5 Also, the Meeting was informed that the MoU signed between the administrations of Brazil and Uruguay had neither been modified. It establishes the interconnection of automated systems between the Curitiba and Montevideo ACCs, carrying secondary radar data information from Durazno to Curitiba, and the Santiago and Cangucu radars, to the Montevideo ACC. The date for the interconnection of radar data and automatic flight plan hand-off is July 2011.

Interconnection of the automated systems between Argentina and Chile

7.6 During the Meeting, an MoU was agreed upon between Argentina-Chile for the exchange of radar data and flight plans between the Santiago (Chile) ACC and the Ezeiza, Córdoba and Comodoro Rivadavia (Argentina) ACCs, with operational implementation date of November 2011. The radars involved in Chile will be Iquique, Antofagasta, Chañaral, La Serena, Santiago, Temuco, Puerto Montt, Balmaceda and Punta Arenas. The radars involved in Argentina are Mendoza, Santa Rosa, Neuquén, Córdoba, San Luis, Tucumán, Salta, La Rioja and Bariloche.

7.7 The delegate of Argentina signed the MoU; Chile informed it would sign it on the week of 26 October and send it to Argentina, copied to the ICAO SAM Regional Office.

Interconnection of the automated systems between Brazil and Venezuela

7.8 In addition, during the Meeting, an MoU was signed between Brazil-Venezuela for the exchange of radar data and flight plans between the Amazónico (Brazil) and Maiquetía (Venezuela) ACCs, with implementation date March 2011 for the exchange of radar data, and May 2011 for the automatic flight plan hand-off. The radars involved are Boa Vista y Sao Gabriel da Cachoeira (Brazil) and Santa Elena de Uairen (Venezuela).

Updating of the regional action plan for the interconnection of automated systems

7.9 The delegate of Peru informed that his Administration was in the implementation phase for a new automated system in the Lima ACC, as well as of radar systems and an ADS B station in the South of the country. In this respect, he informed that, once the implementation tasks pertaining to these systems were completed, the MoU establishment process with the States of the Region with adjacent ACCs to the Lima ACC and that had automated systems installed, would commence.

7.10 In the same manner, the delegate of Ecuador informed with would draft MoUs with the States of the Region with adjacent ACCs to the Guayaquil ACC, that had automated systems installed.

7.11 The Meeting, on the basis of the information received as to the progress made in the interconnection of automated systems, proceeded to amend the regional action plan shown in the **Appendix A** to this Agenda Item.

Implementation of the new flight plan format in the SAM Region

7.12 The Meeting took note of the information presented in WP/21 and its Appendices A, B, C, D and E, with the aim of becoming aware of the progress in the implementation of Amendment 1 to the PANS/ATM, the naming of focal points, the analysis made to the automated systems and the action plans presented by the SAM States for the implementation of Amendment 1.

7.13 The meeting examined the action plan for the implementation of the new flight plan format – Amendment 1 to the 15th Edition of ICAO Document 4444 (PANS/ATM) in the SAM Region. The result of the review is shown in **Appendix B** to this part of the Report.

Focal points

7.14 The Meeting reviewed the list of focal points presented, and its result is shown in **Appendix C** to this part of the report with the designation of all SAM Region focal points. In this sense, the Meeting recalled the importance that States that have not yet done so, prioritize in the implementation of their national committees, to be composed by air navigation services providers and users, with the aim of coordinating the implementation tasks of the new format through coordination meetings, and that they keep updated the information pertaining to the focal points.

7.15 In this sense, the Secretariat will inform ICAO Headquarters the names of those designated as focal points for the SAM States, for its dissemination in the appropriate section established in the Flight Information Tracking System (FITS) web site, taking into account the need to coordinate among the States' focal points for the implementation of Amendment 1 to the 15th Edition of ICAO PANS/ATM (Doc. 4444).

Analysis to the impact of Amendment 1 to the PANS/ATM on the automated systems

7.16 Appendix C to WP/21 presents an analysis made by some States of the Region to the automated systems installed at the main ATS units. In this respect, during the Seminar/Workshop for the Implementation of the New Flight Plan Format in the SAM Region, carried out in Lima from 13 to 15 September 2010, consideration was given that States of the Region should start elaborating technical specifications for the implementation of the modifications in the templates of the AMHS terminals installed, with the aim of accepting new alphanumeric values in the new flight plan format Item 10, as well as the adding in capability of alphanumeric characters in Items 10 and 18 of the AMHS terminals templates.

7.17 Also, States should start preparing technical specifications in order that the flight plan processing systems (FDP) carry out the changes in the new flight plan format.

7.18 The result of the States' work pertaining to the tests carried out is shown in **Appendix D** to this part of the report. In this sense, the Meeting formulated the following conclusion:

Conclusion SAM/IG/6-11 – Changes in the AMHS systems and in the FDP for the implementation of Amendment 1 to the PANS/ATM

That SAM States take into account the contents of Appendix D to this Agenda Item, with the aim that by 1 July 2012 they operate with the NEW flight plan format, in addition to the CURRENT format, States that have identified problems in their AMHS must make the corresponding changes before 31 December 2011. Also, the changes to make in the FDP installed at the various ATS units should be effected by the end of March 2012.

National action plans for the implantation of the new flight plan format

7.19 The Meeting examined the action plans for the implementation of Amendment 1 prepared by Argentina, Chile, Guyana, Panama, Perú, Uruguay and Venezuela in follow-up to Conclusion SAM/IG/4-8, especially with regard to the agreement of their plans with the dates established in the regional strategy. The Meeting proposed that States who have not yet done so, take as reference the model action plan presented by the Secretariat, as well as the action plan presented by Brazil during the Seminar/Workshop for the Implementation of the New Flight Plan Format, which appear as **Appendices E and F** to this Agenda Item, for the drafting of their national plans. In this sense, the Meeting formulated the following conclusion:

Conclusion SAM/IG/6-12 - Action plan for the implementation of Amendment 1 to Doc. 4444

That SAM States, taking into account the actions indicated in the strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS/ATM (Doc 4444), and using as reference the action plan model presented by the Secretariat and the action plan presented by Brazil during the Seminar/Workshop, which appear as Appendices E and F to this part of the report, draft their action plans for the implementation of the Amendment and send it to the ICAO SAM Regional Office no later tan 30 November 2010.

Seminar/workshop on the implementation of the new flight plan format

7.20 The Meeting took note of the results from Seminar/Workshop for the Implementation of the New Flight Plan Format in the SAM Region counted with the assistance of 41 delegates from 10 States – Argentina, Bolivia, Brazil, Chile, Panama, Paraguay, Peru, Suriname, Uruguay and Venezuela, 1 International Organization – IATA, and 5 industry providers -- Adacel Inc., Atech, Indra, Ineco-Tifsa and Radiocom Inc.

7.21 The presentations, working papers and report with aspects relevant to the Seminar/Workshop are published in the ICAO Regional Office web site http://www.lima.icao.int/MeetProg/mt_MeetingDocumentation.asp?wShortTitle=FLIGTPLAN&wLanguage=S&wYear=2010.

7.22 For mid-2011, a second seminar/workshop on the implementation of the new flight plan format has been scheduled, with the aim of carrying out, among other aspects, an evaluation of the risks to the system before the implementation of Amendment 1 to the PANS/ATM, and this be documented through the formulation of a safety plan for its implementation and, thus, comply with ICAO Annex 11 (para. 2.27).

7.23 In this sense, the Meeting recognized the importance that States name people involved with the topic on the implementation of Amendment 1 to the 15th Edition of the PANS/ATM as one of the actions of the SAM Region for the implementation of the new flight plan format.

Minimum requirements and deliverables for the updating of automated systems

7.24 The Meeting took note of the information presented in WP/25 and its Appendix A, related with the updating proposed to the automation system (AirCon 2000) at Montevideo ACC for the implementation of Amendment 1.

7.25 Taking said working paper as a basis, the Meeting drafted guidance material with the minimum deliverable requirements to be considered in the updating of the automated systems, in accordance with Amendment 1 to the 15th Edition of the ICAO PANS/ATM (Doc. 4444).

7.26 The result of the work carried out is shown in **Appendix G** to this part of the report, which is to serve as a guide with the minimum requirements and some of the deliverables to be considered in the updating of the automated systems for the implementation of Amendment 1.

Organization of the SAM/IG Group to provide a better support to the new flight plan format

7.27 The analysis on the actions to carry out for the implementation of the new flight plan format has been made to date through the SAM/IG Automation Group. In view that this topic takes under consideration operational aspects and users' needs, the Meeting considered it more appropriate that the subject be dealt which by a specific group, to be named Implementation Group for the New Flight Plan Format.

7.28 For this Meeting, an ad-hoc group was established to deal with the matter. In this sense, the Meeting formulated the following conclusion:

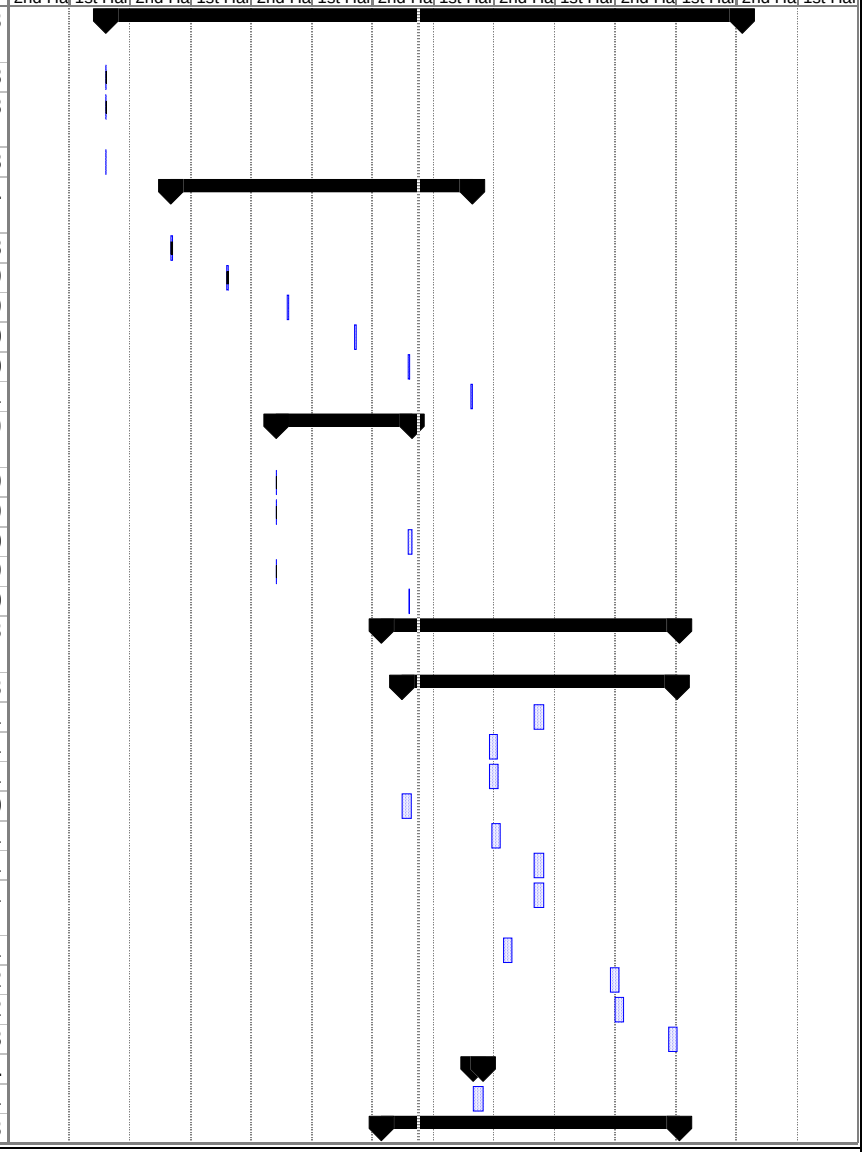
Conclusion SAM/IG/6-13 – Establishment of the Implementation Group for the New flight Plan Format

That SAM/IG establish a new group, to be named Implementation Group for the New Flight Plan Format, which would be in charge of the analysis on the actions to take for the implementation of the new flight plan format in the SAM Region, in order that in each SAM/IG meeting to be held in 2011 and 2012, the Group will have the opportunity of having a specific forum for the follow-up of this activity.

Appendix A to the Report on Agenda Item 7 / Apéndice A al Informe sobre la Cuestión 7 del Orden del Día

APPENDIX A / APENDICE A

ID	Nome da tarefa	Duration	Start	Finish
1	**SAM Region Interconnection Plan / Plan de Interconexión Región SAM**	**1370 days**	**Mon 4/21/08**	**Fri 7/19/13**
2	Plan approval / Aprobación del Plan	1 day	Mon 4/21/08	Mon 4/21/08
3	Establishment of management team / Creación del equipo de gestión	1 day	Mon 4/21/08	Mon 4/21/08
4	Execution / Ejecución	1 day	Mon 4/21/08	Mon 4/21/08
5	**Coordination meetings / Reuniones de coordinación**	**650 days**	**Mon 11/3/08**	**Fri 4/29/11**
6	SAM/IG/2	5 days	Mon 11/3/08	Fri 11/7/08
7	SAM/IG/3	5 days	Mon 4/20/09	Fri 4/24/09
8	SAM/IG/4	5 days	Mon 10/19/09	Fri 10/23/09
9	SAM/IG/5	5 days	Mon 5/10/10	Fri 5/14/10
10	SAM/IG/6	5 days	Mon 10/18/10	Fri 10/22/10
11	SAMIG/7	5 days	Mon 4/25/11	Fri 4/29/11
12	**MoU establishment / Establecimiento de MoU**	**293 days**	**Wed 9/16/09**	**Fri 10/29/10**
13	Argentina - Uruguay	1 day	Wed 9/16/09	Wed 9/16/09
14	Argentina - Brasil	1 day	Wed 9/16/09	Wed 9/16/09
15	Argentina - Chile	10 days	Mon 10/18/10	Fri 10/29/10
16	Brasil - Uruguay	1 day	Wed 9/16/09	Wed 9/16/09
17	Brasil -Venezuela	1 day	Thu 10/21/10	Thu 10/21/10
18	**Flight plan interconnection / Interconexión de plan de vuelo**	**641 days**	**Fri 7/30/10**	**Fri 1/11/13**
19	**OLDI**	**592 days**	**Thu 9/30/10**	**Fri 1/4/13**
20	EZEIZA-SANTIAGO	22 days	Tue 11/1/11	Wed 11/30/11
21	BOGOTA - GUAYAQUIL	18 days	Mon 6/20/11	Wed 7/13/11
22	BOGOTA - PANAMA	20 days	Mon 6/20/11	Fri 7/15/11
23	BOGOTA - BARRANQUILLA	20 days	Thu 9/30/10	Wed 10/27/10
24	BARRANQUILLA - PANAMA	20 days	Mon 6/27/11	Fri 7/22/11
25	SANTIAGO - CORDOBA	22 days	Tue 11/1/11	Wed 11/30/11
26	SANTIAGO - COMODORO RIVADÁVIA	22 days	Tue 11/1/11	Wed 11/30/11
27	AMAZÓNICO-BOGOTÁ	20 days	Mon 8/1/11	Fri 8/26/11
28	LIMA - SANTIAGO	20 days	Mon 6/18/12	Fri 7/13/12
29	LIMA - GUAYAQUIL	20 days	Mon 7/2/12	Fri 7/27/12
30	LIMA - BOGOTA	20 days	Mon 12/10/12	Fri 1/4/13
31	**DOC 44444**	**22 days**	**Mon 5/2/11**	**Tue 5/31/11**
32	AMAZONICO - MAIQUETIA	22 days	Mon 5/2/11	Tue 5/31/11
33	**AIDC**	**641 days**	**Fri 7/30/10**	**Fri 1/11/13**



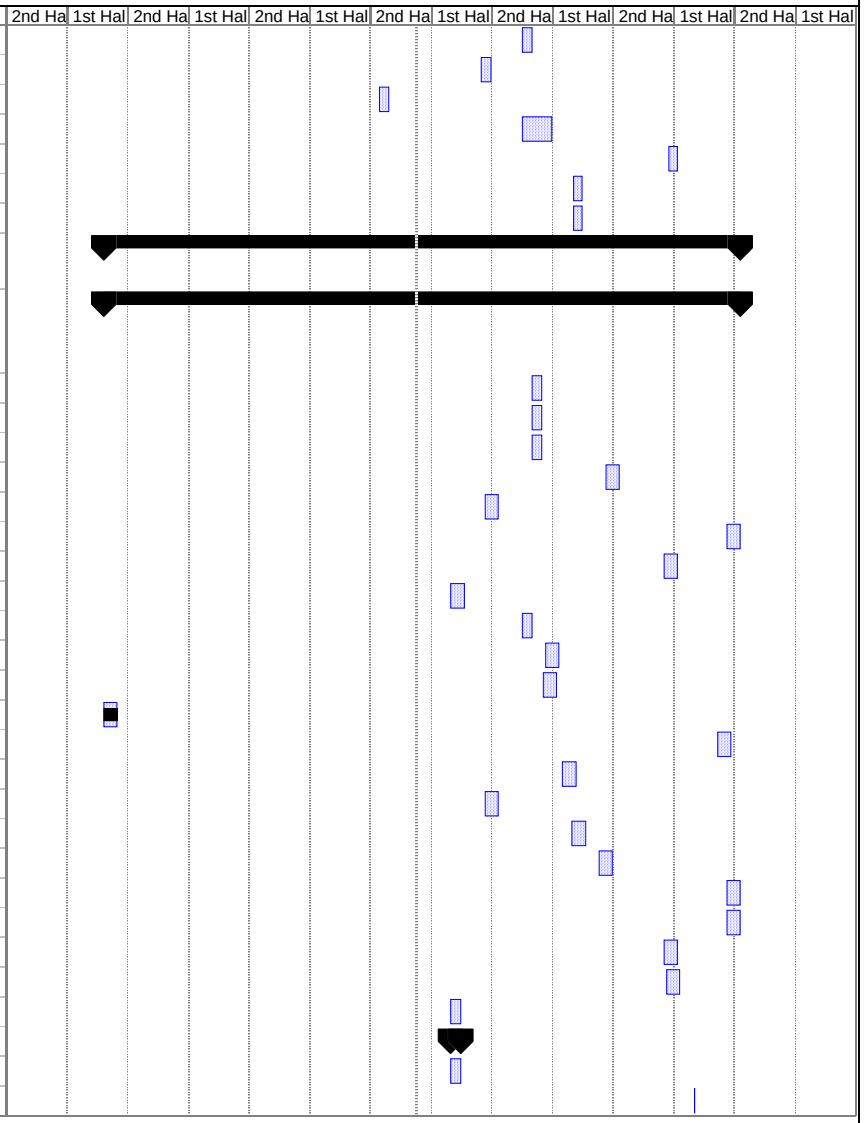
Projeto: PLAN ACCIÓN INTERCONEX
Data: Mon 11/15/10

Tarefa
Divisão
Andamento
Etapa
Resumo
Resumo do projeto
Tarefas externas
Etapa externa
Prazo final

Appendix A to the Report on Agenda Item 7 / Apéndice A al Informe sobre la Cuestión 7 del Orden del Día

APPENDIX A / APENDICE A

ID	Nome da tarefa	Duration	Start	Finish
34	CURITIBA-RESISTENCIA	21 days	Mon 10/3/11	Mon 10/31/11
35	CURITIBA - MONTEVIDEO	22 days	Wed 6/1/11	Thu 6/30/11
36	EZEIZA-CORDOBA	20 days	Fri 7/30/10	Thu 8/26/10
37	EZEIZA - MONTEVIDEO	65 days	Mon 10/3/11	Fri 12/30/11
38	LIMA - AMAZONICO	20 days	Mon 12/17/12	Fri 1/11/13
39	ASUNCIÓN - CURITIBA	20 days	Mon 3/5/12	Fri 3/30/12
40	ASUNCIÓN - EZEIZA	20 days	Mon 3/5/12	Fri 3/30/12
41	**Radar data exchange / Intercambio de datos radar**	**1370 days**	**Mon 4/21/08**	**Fri 7/19/13**
42	**Direct connection to centre - ASTERIX / Conexión Directa al Centro - ASTERIX**	**1370 days**	**Mon 4/21/08**	**Fri 7/19/13**
43	CORDOBA – SANTIAGO	22 days	Tue 11/1/11	Wed 11/30/11
44	EZEIZA - SANTIAGO	22 days	Tue 11/1/11	Wed 11/30/11
45	SANTIAGO - C. RIVADÁVIA	22 days	Tue 11/1/11	Wed 11/30/11
46	MENDOZA – SANTIAGO	30 days	Mon 6/11/12	Fri 7/20/12
47	EZEIZA – PUERTO MONTT	30 days	Mon 6/13/11	Fri 7/22/11
48	PUNTA ARENAS – C. RIVADAVIA	30 days	Mon 6/10/13	Fri 7/19/13
49	AMAZONICO – BOGOTA	30 days	Mon 12/3/12	Fri 1/11/13
50	CURITIBA – MONTEVIDEO	30 days	Tue 3/1/11	Mon 4/11/11
51	CURITIBA - RESISTENCIA	21 days	Mon 10/3/11	Mon 10/31/11
52	BOGOTA – GUAYAQUIL	30 days	Mon 12/12/11	Fri 1/20/12
53	BOGOTA – PANAMA	30 days	Mon 12/5/11	Fri 1/13/12
54	BOGOTA – BARRANQUILLA	30 days	Mon 4/21/08	Fri 5/30/08
55	BOGOTA – LIMA	30 days	Mon 5/13/13	Fri 6/21/13
56	BOGOTA – MAIQUETÍA	30 days	Tue 1/31/12	Mon 3/12/12
57	BARRANQUILLA – PANAMA	30 days	Mon 6/13/11	Fri 7/22/11
58	BARRANQUILLA – MAIQUETÍA	30 days	Wed 2/29/12	Tue 4/10/12
59	LIMA – SANTIAGO	30 days	Mon 5/21/12	Fri 6/29/12
60	LIMA – GUAYAQUIL	30 days	Mon 6/10/13	Fri 7/19/13
61	LIMA – AMAZONICO	30 days	Mon 6/10/13	Fri 7/19/13
62	ASUNCIÓN – CURITIBA	30 days	Mon 12/3/12	Fri 1/11/13
63	ASUNCIÓN – EZEIZA	30 days	Mon 12/10/12	Fri 1/18/13
64	MONTEVIDEO-EZEIZA	23 days	Tue 3/1/11	Thu 3/31/11
65	**ICD owner / ICD propietario**	**23 days**	**Tue 3/1/11**	**Thu 3/31/11**
66	AMAZONICO - MAIQUETIA	23 days	Tue 3/1/11	Thu 3/31/11
67	Inter-Centro ASTERIX 62,63 (TBD)	1 day	Mon 3/4/13	Mon 3/4/13



Projeto: PLAN ACCIÓN INTERCONEX
Data: Mon 11/15/10

Tarefa
Divisão
Andamento
Etapa
Resumo
Resumo do projeto
Tarefas externas
Etapa externa
Prazo final

APPENDIX B

ACTION PLAN FOR THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT – AMENDMENT 1 TO THE 15th EDITIOIN OF ICAO DOCUMENT 4444 (PANS/ATM)

ACTIVITIES	ACTION BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
Approval of Amendment 1 to the 15th Edition of PANS/ATM – Doc 4444 – (*Procedures for air navigation services – air traffic management)* (ICAO State letter 13/2.1-08/50 of 25 June 2008)	SAM States	Take note of the Amendment	December2008	Completed
Guidelines for the inclusion of the flight plan information as per Amendment 1 to the 15th Edition of PANS/ATM- Doc 4444 (ICAO State letter AN 13/2.1-09/9 of 6 February 2009	SAM States	Take note of the ICAO guidelines	June 2009	Completed
Draft a regional strategy for the implementation of Amendment 1 to the PANS/ATM	RLA/06/901 project	Regional strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM - Doc 4444	October 2009	Completed. The strategy approved by SAM/IG/4 meeting for its adoption in the SAM Region was approved for the CAR/SAM Regions at the meeting of the CNS/ATM Subgroup (March 2010)
Draft a national plan for the implementation of Amendment 1 to the PANS/ATM	SAM States	National plan for the for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM - Doc 4444	End of April 2010 – Extension to 30 November 2010, for adjustments in accordance with models presented	Plans received from Argentina, Brazil, Chile, Guyana, Peru, Panama, Paraguay, Uruguay and Venezuela.

ACTIVITIES	ACTION BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
Nomination of focal points for the coordination between ICAO and States in the implementation of Amendment 1 to the PANS/ATM	SAM States	SAM States focal points for the coordination between ICAO and States in the implementation of Amendment 1 to the PANS/ATM	7 May 2010	Completed. See Appendix C to this Agenda Item.
Analyze the checklist of systems involved in the flight plan process to evaluate the impact of the implementation of the new flight plan format in the automated systems	SAM/IG meeting	Checklist of systems involved in the flight plan process and its impact on the new flight plan format	SAM/IG/5	See Appendix D to this Agenda Item. Systems affected: flight plan format templates of AMHS terminals and flight plan processors (FDP).
Carry out an analysis on the impact of the implementation of the new flight plan format in the SAM States automated systems	SAM States	Impact of the implementation of the amendment in the automated systems	End of August 2010	Carried out to following States: Argentina, Brazil, Chile, Colombia, Ecuador, Guyana, Panama, Peru, Suriname, Uruguay and Venezuela
Preparation of a SAM seminar/workshop for the implementation of Amendment to the PANS/ATM	ICAO Secretariat	Seminar/Workshop for the Implementation of Amendment 1 to the PANS/ATM	Lima, Peru, 13 to 15 September 2010	Carried out with the participation of 41 delegates from 10 States (Argentina, Bolivia, Brazil, Chile, Panamá, Paraguay, Perú, Suriname, Uruguay and Venezuela; 1 international organization (IATA), 5 providers (Adacel Inc., Atech, Indra, Ineco-Tifsa and Radiocom Inc.)
Hold national meetings between providers and users when implementing Amendment 1 to the PANS/ATM	SAM States	Establishment of a national schedule of meetings for the implementation of Amendment 1 to the PANS/ATM	Necessary national meetings for 2010-2012	The number of national meetings would be determined by the States
Prepare user and service provider personnel on the implementation of Amendment 1 to the PANS/ATM	SAM States	Service provider and user personnel trained on Amendment 1 to the PANS/OPS, under a national training programme	October 2010-November 2012	

ACTIVITIES	ACTION BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
Study the implementation of the transition to the new flight plan format (operation taking under consideration the current and new format)	RLA/06/901 project	Study the implementation of Amendment 1 to the PANS/ATM, during the transition phase	SAM/IG/6	
Implementation of the new flight plan format in accordance with the strategy on the implementation of Amendment 1 to the 15th Edition of the PANS/ATM- Doc 4444	SAM States	Systems involved in the FPL process with capability to operate the new FPL format	End of June 2012	
Implementation of activities permitting systems involved in the FPL to operate with the current and new FPL	SAM States	Systems involved in the FPL process with capability to act upon the current and new flight plan during the transition period	End of 2012	If the new plan is implemented before June 2012, same will be only used on a trial basis (national, intra- and inter-regional), continuing to operate with the current flight plan format. In addition, during this period, pre-operational trials can be carried out (national, intra- and inter-regional)
Keep the Regional Office informed on the progress of activities, as well as on date changes in the action plans	SAM States	Updated information of the action plan	Continuous process until 15/12/2012	
Implementation of operational phase with the current and new flight plan	SAM States	Systems involved in the FPL process operating with the current and new format	1 July 2012 to 15 November 2012	The new FPL format should not become operational before 1 July 2012

APPENDIX C / APENDICE C

PUNTOS FOCALES PARA LA COORDINACIÓN DEL FORMATO DE PLAN DE VUELO / FOCAL POINTS FOR THE COORDINATION OF THE FLIGHT PLAN FORMAT

Estado/State Organization	Autoridad / Authority		E-mail	T / F
	Area	Nombre y título / Name and Title		
1	2	3	5	6
Argentina		Omar GouarnalusseDepartamento CNS de la Dirección Nacional de Servicio de Navegación Aérea y Aeródromo, ANAC	ogouarna@faa.mil.ar	T: + 54 11 4317 6667
Bolivia		Miguel Castillo Ochoa Jefe Unidad ATM/SAR, DGAC	mcastillo@dgac.gov.bo	T: +591 2 211 4465
		Ivan Rojas Zeballos Supervisor ACC, AASANA	irojas@asana.gov.bo	T: +591 2 281 0203
Brasil	ATM/ PBN	Jorge Wilson de Avila F. Penna Departamento de Control del Espacio Aéreo, DECEA	adjpln@decea.gov.br	T: +5521 94997635 +5521 21016477
Chile		Marcial Vidal Arriagada Controlador de Tránsito Aéreo, DGAC	mvidal@dgac.cl	T: +56 2 290 4709
Colombia	PBN	Gladys Mercedes Roa de la Cruz AIS, UAEAC	gladis.roa@aerocivil.gov.co	T: +571 266 3693 +571 266 2514
Ecuador		Ivan Guillermo Sala Garzon Jefe Departamento Radar	ivan_salas@dgac.gov.ec	T: +5932 222 8309
French Guiana		Jean Jacques Deschamps Head, Technical Department for the ANSP in French Antilles and Guyana, DIRAC	jean-jacques.deschamps@aviation-civile.gouv.fr	
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		Rickford Samaroo Manager ATS Operations, CAD	satcori@hotmail.com	T: +592 261 2564 F: +592 261 2279
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Paraguay		Liz Rocío Portillo Castellanos Sección Normas y Reglamentos, DINAC	nyrlrpc@dinac.gov.py lizroportillo@gmail.com	T: +595 21 205 365
		David Ricardo Torres Sección Terminales AMHS/GTE, DINAC	dr.torres33@gmail.com	T: +595 21 645707/08 +595 21 205365 F: +595 21 645598
Perú		Paulo Vila Inspector CNS, DGAC	pvila@mtc.gob.pe	T: +511 615 7880 F: +511 615 7881
Suriname		Lunette Rinelda Edam AIS/Maps and Charts and Communication	ais@cadsur.sr; edamlunette@hotmail.com	T: +597 498-898 F:+ 597 498-901
		Doris Kranenburg AIS/Maps and Charts and Communication	ais@cadsur.sr; do12burg@hotmail.com	Tel.: +597 498-898 Fax:+ 597 498-901

Estado/State Organization	Autoridad / Authority		E-mail	T / F
	Area	Nombre y título / Name and Title		
1	2	3	5	6
Uruguay		José Pastoriza Rodríguez Adjunto Oficina Técnica de Tránsito Aéreo, DINACIA	jpastori@gmail.com	T: +5982 604 0251, Ext. 5200 F: +5982 6040251, Ext. 5201
Venezuela		Kender Ferrer Jefe OPS ACC MIQ, INAC	k.ferrer@inac.gob.ve	T: +58 212 580 4444 F: +58 426 3317 687
		Vicente Fiore Jefe de MMTO Radar Maiquetía, INAC	v.fiore@inac.gob.ve	T: +58 416 6235 643
		Benjamín Uquillas Jefe Subcentro Comunicaciones Maiquetía, INAC	buquillas@gmail.com	T: +58 412 721 5068

APPENDIX D

RESULT OF THE TRIALS IN ARGENTINA

The tests in ACC Ezeiza were carried out on 5 and 6 August 2010. The Ezeiza ACC has Radiocom AMHS terminals installed. The automation system for the Ezeiza ACC is an INDRA AIRCON 2100 and was installed in 2009. The AIRCON 2100 includes flight plan processor, radar data processor, operator control positions, area situation screens, aeronautical information screens, flight strips printer, control and supervision system, and data recording system.

The tests assessed the impact on the changes to flight plan Itemes 7, 8, 10 15 y 18 in the AFTN, AMHS, repetitive flight plan, flight plan processing, flight progress strips automatic printing, radar data processing and flight plan presentation systems. The results obtained are shown in **Attachment A** to this Appendix B.

In addition to the results in Attachment A, the following remarks are to be noted:

a) The repetitive flight plan (RPL) system is not used, even though the AIRCON 2100 system has the capability to process it;
b) The AMHS is still not integrated to the AIRCON 2100, the messages go through the RADIOCOM AMHS/AFTN gateway;
c) The AMHS has a limit of up to 14 alphabetical characters in the FPL template, Item 10;
d) The AIRCON 2100 FDP, upon rejecting the messages with unknown contents, shows the following error message **"**Unknown Message Type" and does not permit carrying out any manual change to the message, which difficults making manual corrections. Nevertheless, this guarantees that no mistaken message enters the system, with its possible consequences;
e) The maximum characters permitted in Item 18 of the AMHS FPL system seems to be enough; nevertheless, the format should be examined, in order to take into consideration all cases of the flight plan's NEW format;
f) The maximum amount of characters permitted in the FDP Item 18 has yet to be determined, which should correspond to the maximum permitted by the AMS in order to avoid loss of information in said Item;
g) The changes to Amendment 1 to Doc 4444 will affect the AMHS of Argentina; nevertheless, ANAC has started to carry out the corresponding updating; and
h) No tests have been made to the flight progress strip automatic printing; nevertheless, it is thought it will not be affected. Also, regarding the flight plan presentation (IHM).

There are plans to also install an AIRCON 2100 in the Cordoba ACC and, eventually, at the rest of the ACCs in Argentina. The updating of the system already counts with contractual arrangements and the provider has assured that the changes required by Amendment 1 to Doc 4444 will be made by the appropriate date.

RESULT OF THE TRIALS IN BRAZIL

The tests at the ACC Brasilia were made on 17 August 2010. The Brasilia ACC manages AFTN terminals (ATECH system, installed in 1998) and RADIOCOM AMHS terminals, installed by ATECH. The Brasilia ACC automation system is the ATECH X-4000 system, installed in 2008. The system basically includes flight data processor, radar data processor, radar signal interfaces, operator control positions, area situation screens, aeronautical information screens, flight strip printer, control and supervision system and data recording system.

The tests assessed the impact of the changes on the flight plan's Itemes 7, 8, 10 15 and 18 pertaining to the AFTN, AMHS, repetitive flight plan, flight plan processing, flight progress strip automatic printing, radar data processing and flight plan presentation systems. The results obtained are shown in **Attachment B** to this Appendix B.

In addition to the results in Attachment B, the following is to be noted:

a) The X-400 FDP system accepts from 1 t 26 alphabetical characters, with the exception of the letter "N", in Item 10 (Equipment);
b) The AMHS user terminal only permits inserting in Item 10 the characters selected from a menu in the template;
c) The X-4000 system is still pending to be integrated with the AMHS;
d) The maximum characters permitted in the AMHS Item 18 is 1024; and
e) The characters entered in Item 18 are automatically presented in the flight progress strip; nevertheless, limited up to a maximum of 37 characters.

RESULT OF THE TRIALS IN CHILE

The tests in ACC Santiago were carried out on 3 and 4 August 2010. The ACC Santiago has Thales AFTN and AMHS terminals installed. The AMHS was installed in 2009. The automated system implemented is the Thales AIRCAT C, installed in December 2009.

The tests evaluated the impact of the changes in the flight plan format Itemes 7, 8, 10 15 and 18 pertaining to the AFTN, AMHS, repetitive flight plan, flight plan processing, flight progress strips automatic printing, radar data processing and flight plan presentation systems. The results obtained are shown in **Attachment C** to this Appendix B.

In addition to the results in Attchment C, the following observations were made:

a) The UROCAT C FPD systems accepts from 1 to 25 alphabetical characters in Item 10 (Equipment);
b) The AMHS presents a limit of up to 19 alphabetical characters in the FPL template's Item 10;
c) The EUROCAT C system remains to be integrated with the AMHS;
d) The Santiago ACC is equipped with EUROCAT C; nevertheless, the APP and ACC installed in the rest of the country continue with EUROCAT 1000. The updating of these APP and ACC are scheduled for 2014. DGAC Chile will evaluate whether it will be feasible to reschedule it for 2012;
e) The maximum number of characters permitted in the AMHS FPL template Item 18 appears to be enough; nevertheless, the format would have to be reviewed in order to take into consideration all cases of the NEW flight plan format. Observation has also been made, for example, the field "TYP/" accepts an unlimited number of characters, while "RMK/" has a limit of 51 characters;
f) The number of maximum characters in the FDP Item 18 has not been determined yet, which should correspond to the maximum permitted by the AMHS to avoid the eventual loss of information in that Item;
g) The changes to Amendment 1 to Doc 4444 will affect the IFIS system of Chile; and
h) No tests have been made to the flight progress strip automatic printing; nevertheless, it is thought it will not be affected. Also, regarding the flight plan presentation (IHM).

Chile does not currently count with a contract with Thales and, to carry out the required changes, it will have to draw a new contract.

RESULTS OF THE TRIALS IN ECUADOR

QUITO APP

AFTN

Upon using the flight plan format installed in the AFTN terminal, the new values were introduced into the new flight plan format Itemes 10 and 18, verifying that the FPL template accepts the new values indicated in the FPL. The FPL template does not have a fixed number of characters for Itemes 10 and 18; this can be defined by the terminal operator.

The problem with this format is that it has no filters to avoid mistakes in the transcription of the flight plan; therefore, the AFTN terminal filters no message, all are sent. If these have errors, same are rejected by the FDPs.

The AFTN system installed in Ecuador is a Syseca installed in 1996.

Automated system

In the Quito APP, an Indra, Model 2100, ATS automated system was installed in 2009, which is composed by a FDP, RPL and RDP systems, FDP user terminals, radar data visualization screens and flight strip printers (EIR).

FDP system

To test the behaviour of the FDP before the new FPL flight plan format, FLP messages were originated from an AFTN terminal with the new values set in the FPL. From the results of the FPL message testing, the following was noted:

a) The FDP does not accept letters E, H and L in Item 10 for the identification of equipment and surveillance capabilities; in addition, it does not accept the new alphanumeric characters to identify the new communications, navigation and surveillance equipment in Item 10;
b) The maximum number of characters accepted in the FDPs FPL Item 10 is of 12: 10 for the characters required for the communications and navigation equipment; and 2 for the surveillance equipment; and
c) The system accepts all the new indicative values destined for Item 18. Item 18 accepts a considerable number of alphanumeric characters. Also, the FDP accepts the changes foreseen in the remaining Itemes of the new flight plan format.

RDP and RPL systems, presentation screen and flight strip printers

These systems are not affected by the new FPL.

GUAYAQUIL ACC

AMHS

Guayaquil has an AMHS working locally, it only communicates via AFTN with the rest of the country through the AMHS/AFTN Gateway. The system is a Radiocom, and was installed in 2007. Guayaquil has five AMHS terminals installed, which count with the templates for FPL messages. These templates have the filters in order that the FPL information exits in accordance with the current FPL format. From the tests carried out, the template does not accept the new alphanumeric values established in the new FPL format, neither letters E, H and L in Item 10, pertaining to the equipment and surveillance capabilities. The only manner to send this new information is to send the FPL message without using the template and using free text.

Automated system

The Guayaquil ACC has an Alenia AMS ATS automated system, installed in 2004. It is composed by an FDP system, an RDP system, FDP user terminals, radar data visualization screens and flight strip printers.

FDP systems

To test the behaviour of the FDP before the new flight plan format, FPL messages were originated from an AFTN terminal, with the new values planned in the FPL. No messages could be sent from the AMHS terminal, as the FPL template does not permit the new values. The following was verified upon:

a) The FDP does not accept letters E, H and L in Item 10 for the identification of equipment and surveillance capabilities; in addition, it does not accept the new alphanumeric characters to identify the new communications, navigation and surveillance equipment in Item 10;
b) The maximum number of characters accepted in the FDPs FPL Item 10 is of 13: 11 for the characters required for the communications and navigation equipment; and 2 for the surveillance equipment; and
c) The system accepts all the new indicative values destined for Item 18. Item 18 accepts a considerable number of alphanumeric characters. Also, the FDP accepts the changes foreseen in the remaining Itemes of the new flight plan format.

RDP and RPL systems, presentation screen and flight strip printers

These systems are not affected by the new FPL.

ATTACHMENT A TO APPENDIX D

TENTATIVE ANALYSIS OF THE IMPACT OF THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE 15TH EDITION OF ICAO DOCUMENT 4444) ON AUTOMATED FLIGHT PLAN PROCESSING SYSTEMS – ARGENTINA/EZEIZA ACC

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Flight Plan Form Item 7: Aircraft identification (7 characters maximum)	Alphanumeric characters with no hyphens or symbols will be used for aircraft identification	No effect.	N/A: RPL is not used in Argentina, In addition, the new Indra AIRCON 2100 system presents facilities that would be required for the dealing of RPLs.	No effect.	No effect.	No effect.	No effect.
Flight Plan Form Item 8: Flight rules and flight types (one or two characters)	a) The classes of flight rules that the pilot intends to apply are more clearly described (I, V, Y, Z). b) The letters for identifying the flight type are maintained, and it is indicated that the flight status must be specified in Item 18 after the STS indicator or when neessary to indicate other reasons after the RMK indicator.	a) and b) no change, no effect.	N/A	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
  Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **Equipment and Capabilities** **A** GBAS landing system	Letter A is assigned to the GBAS landing system. There was no previous assignment for this letter.	No effect.	N/A	No effect.	No effect.	No effect.	No effect.
Item 10 **(**Part A)* **B** LPV (APV with SBAS)	Letter B is assigned to specify an LPV-capable aircraft (APV with SBAS). There was no previous assignment for this letter.	No effect.	N/A	No effect.	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **E1, E2 and E3** **E1**: ACARS FMC WPR **E2**: ACARS D-FIS **E3**: ACARS PDC	Letter E had not been assigned before. A numeric value is inserted next to letter E.	Affects: the AMHS FPL template does not accept numbers	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **J1, J2, J3, J4, J5, J6 and J7** **J1**: CPDLC ATN VDL Mode 2 **J2**: CPDLC FANS 1/A HFDL **J3**: CPDLC FANS1/A VDL Mode A **J4**: CPDLC FANS1/A VDL Mode 2 **J5**: CPDLC FANS1/A SATCOM (INMARSAT) **J6**: CPDLC FANS/1/A SATCOM (MTSAT) **J7**: CPDLC FANS 1/A SATCOM (Iridium)	A numerical value is inserted in addition to letter J, and letter J, which originally identified data link, now identifies the various means for CPDLC.	Affects: the AMHS FPL template does not accept numbers	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **M1, M2 and M3** **M1**: ATC RTF SATCOM (INMARSAT) **M2**: ATC RTF (MTSAT) **M3**: ATC RTF (Iridium)	Letter M is associated to satellite RTF. A number identifying the satellite system used is inserted next to letter M.	Affects: the AMHS FPL template does not accept numbers	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **P1-P9** Reserved for RCP	Letter P links communication performance requirements. A number is inserted next to letter P to identify the various performance requirements.	Affects: the AMHS FPL template does not accept numbers	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **R** Approved PBN	Letter R is associated to the approved PBN, and was previously associated to RNP type certification. When letter R is used, PBN values reached are specified in Item 18 after the PBN/ indicator.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **W** Approved RVSM	Letter W is assigned to identify RVSM approval.	No effect	N/A	No effect	No effect	No effect	No effect
Item 10 **(**Part A)* **X** Approved MNPS	Letter X is assigned to identify MNPS.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Y** VHF with 8.33Khz separation capability	Letter Y is assigned to identify the capability of the VHF system to operate with a 8.33 Khz separation.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Z** Other equipment installed on board or other capabilities	In addition to other equipment installed on board, the term for other capabilities is also inserted. Other equipment or capabilities must be specified in the flight plan, in Item 18, after a new DAT/ indicator.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **E Transponder-Mode S**	Letter E indicates: Transponder Mode S, including aircraft identification, pressure altitude, and extended squitter capability (ADS-B).	AMHS: It would currently not accept the letter E	N/A	Affects: Does not accept the letter E	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **H Transponder-Mode S**	Letter H indicates Transponder Mode S, including aircraft identification, pressure altitude, and improved surveillance capability.	AMHS: It would currently not accept the letter H	N/A	Affects: Does not accept the letter H	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **I Transponder-Mode S**	Letter I indicates Transponder Mode S, including aircraft identification, but with no pressure altitude capability.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **L Transponder Mode S**	Letter L in the new format indicates Transponder Mode S, pressure altitude, extended squitter (ADS-B) and enhanced surveillance capabilities	AMHS: It would currently not accept the letter L	N/A	Affects: Does not accept the letter L	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **X Transponder Mode S**	Letter X in the new format indicates Transponder Mode S, with no aircraft identification or pressure altitude capability.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-B** **B1 and B2** **B1**: ADS-B with specialised 1090Mhz ADS-B out capability **B2**: ADS-B with specialised 1090Mhz ADS-B out and ADS-B in capability **U1 and U2** **U1**: ADS-B out capability using UAT **U2**: ADS-B out and in capability using UAT **V1 and V2** **V1**: ADS-B out capability using VDL-4 **V2**: ADS B out and in capability using VDL-4	Letters B, U, and V indicate new capabilities for ADS-B depending whether the equipment broadcasts in 1090Mhz, UAT, or VDL 4. Numbers are inserted next to the letters to identify ADS-B out and ADS-B out and in capabilities.	Affects: the AMHS FPL template does not accept numbers	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-C D1 and G1** **D1**: ADS-C with FANS1/A capabilities **G1**: ADS–C with ATN capabilities	D and G are new letters to which a numeric value is added, and indicate ADS-C with FANS1/A capabilities and ADS-C with ATN capabilities.	Affects: the AMHS FPL template does not accept numbers	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 15 Marking and distance route with respect of a significant point	The identification of a significant point followed by a 3 digit mark from the point, giving the magnetical degrees, followed by the distance from the point, with 3 digits expressing nautical miles	No effect	N/A	Affects: The FDP does not accept and presents an error message: "Unknown Message Type"	No effect	No effect	No effect
Item 18 SUR/ indicator	Additional surveillance applications should be listed in Item 18 after the SUR/ indicator.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **STS/ indicator** **ALTRV** **ATFMX** **FFR** **FLTCK**	The reason for special management by ATS, for instance search and rescue mission, as follows: **ALTRV**: for a flight conducted according to an altitude reservation **ATFMX**: for a flight whose exemption from ATFM measures has been approved by the appropriate ATS authorities **FFR**: Fire fighting **FLTCK**: flight check for calibration of navigation aid.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **STS/ indicator** **HAZMAT** **HEAD** **HOSP**	**HAZMAT**: for a flight carrying hazardous material **HEAD**: a flight with Head of State status **HOSP**: for a medical flight declared by the medical authorities.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **STS/ indicator HUM MARSA MEDEVAC NONRVSM**	**HUM**: for a flight conducting a humanitarian mission. **MARSA**: for a flight for which a military entity assumes the responsibility for its separation from military aircraft **MEDEVAC**: for a medical emergency evacuation that is critical to save lives. **NONRVSM**: For a flight that has no RVSM capability and intends to operate in RVSM airspace.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	
Item 18 (Cont.) **STS/ indicator SAR STATE**	**SAR**: for a flight conducting a search and rescue mission **STATE**: for a flight performing military customs or police services.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **PBN/ indicator RNAV specification** **A1**: RNAV10 (RNP10) **B1**: RNAV5 All of the allowed sensors **B2**: RNAV5 GNSS **B3**: RNAV5 DME/DME **B4**: RNAV5 VOR/DME **B5**: RNAV5 INS or IRS **B6**: RNAV5 LORAN C	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
  Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNAV specification** **C1:** RNAV2 with all sensors **C2:** RNAV2 with GNSS **C3:** RNAV2 DME/DME **C4:** RNAV2 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **PBN/ indicator RNAV specification** **D1:** RNAV 1 with all sensors **D2:** RNAV1 GNSS **D3:** RNAV1 DME/DME **D4:** RNAV1 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNP specification** **L1**: RNP-4 **O1**: Basic RNP with all allowed sensors **O2**: Basic RNPGNSS **O3**: Basic RNP 1 DME DME **O4**: Basic RNP1 DME/DME /IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNP specification** **S1:** RNP APPCH **S2:** RNP APPCH with Baro VNAV	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNP specification** **T1**: RNP AR APPCH with RF **T2**: RNP AR APPCH without RF	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 DLE/ indicator	**DLE** New indicator related to en-route delay or holding. En-route significant points where delay is expected to occur are to be inserted, followed by the duration of the delay, using four digits for time, in hours and minutes.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 ORGN/ indicator	The 8-letter AFTN address of the originator and other details of the appropriate contact, when the flight plan originator cannot be easily identified as stipulated by the appropriate authority.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 TALT/ indicator	Four-letter ICAO indicators for alternate take-off aerodromes as specified in Location Indicators, Doc 7910 or the name of the alternate en-route aerodromes if no indicator is assigned. For aerodromes not listed in the relevant aeronautical information publication, indicate the location in LAT/LONG or bearing and distance with respect to the closest significant point as described in DEP/.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 DOF/ indicator	Date of departure of the flight in a six-digit format (YYMMDD), where AA is the year, MM the month, and DD is the day.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

ATTACHMENT B TO APPENDIX D

TENTATIVE ANALYSIS OF THE IMPACT OF THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE 15TH EDITION OF ICAO DOCUMENT 4444) ON AUTOMATED FLIGHT PLAN PROCESSING SYSTEMS – BRAZIL/BRASILIA ACC

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Flight Plan Form Item 7: Aircraft identification (7 characters maximum)	Alphanumeric characters with no hyphens or symbols will be used for aircraft identification	No effect.	No effect	No effect.	No effect.	No effect.	No effect.
Flight Plan Form Item 8: Flight rules and flight types (one or two characters)	a) The classes of flight rules that the pilot intends to apply are more clearly described (I, V, Y, Z). b) The letters for identifying the flight type are maintained, and it is indicated that the flight status must be specified in Item 18 after the STS indicator or when neessary to indicate other reasons after the RMK indicator.	a) and b) no change, no effect.	No effect	a) and b) no change, no effect. Remarks: Later changes from IFR to VFR o viceversa many not be processed, even though no error messages would be generated	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
  Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **Equipment and Capabilities** **A** GBAS landing system	Letter A is assigned to the GBAS landing system. There was no previous assignment for this letter.	No effect.	No effect	No effect.	No effect.	No effect.	No effect.
Item 10 **(**Part A)* **B** LPV (APV with SBAS)	Letter B is assigned to specify an LPV-capable aircraft (APV with SBAS). There was no previous assignment for this letter.	No effect.	No effect	No effect.	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **E1, E2 and E3** **E1**: ACARS FMC WPR **E2**: ACARS D-FIS **E3**: ACARS PDC	Letter E had not been assigned before. A numeric value is inserted next to letter E.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **J1, J2, J3, J4, J5, J6 and J7** **J1**: CPDLC ATN VDL Mode 2 **J2**: CPDLC FANS 1/A HFDL **J3**: CPDLC FANS1/A VDL Mode A **J4**: CPDLC FANS1/A VDL Mode 2 **J5**: CPDLC FANS1/A SATCOM (INMARSAT) **J6**: CPDLC FANS/1/A SATCOM (MTSAT) **J7**: CPDLC FANS 1/A SATCOM (Iridium)	A numerical value is inserted in addition to letter J, and letter J, which originally identified data link, now identifies the various means for CPDLC.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **M1, M2 and M3** **M1**: ATC RTF SATCOM (INMARSAT) **M2**: ATC RTF (MTSAT) **M3**: ATC RTF (Iridium)	Letter M is associated to satellite RTF. A number identifying the satellite system used is inserted next to letter M.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **P1-P9** Reserved for RCP	Letter P links communication performance requirements. A number is inserted next to letter P to identify the various performance requirements.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **R** Approved PBN	Letter R is associated to the approved PBN, and was previously associated to RNP type certification. When letter R is used, PBN values reached are specified in Item 18 after the PBN/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **W** Approved RVSM	Letter W is assigned to identify RVSM approval.	No effect	No effect	No effect	No effect	No effect	No effect
Item 10 (Part A)* **X** Approved MNPS	Letter X is assigned to identify MNPS.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Y** VHF with 8.33Khz separation capability	Letter Y is assigned to identify the capability of the VHF system to operate with a 8.33 Khz separation.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Z** Other equipment installed on board or other capabilities	In addition to other equipment installed on board, the term for other capabilities is also inserted. Other equipment or capabilities must be specified in the flight plan, in Item 18, after a new DAT/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **E Transponder-Mode S**	Letter E indicates: Transponder Mode S, including aircraft identification, pressure altitude, and extended squitter capability (ADS-B).	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept the letter E	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **H Transponder-Mode S**	Letter H indicates Transponder Mode S, including aircraft identification, pressure altitude, and improved surveillance capability.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept the letter H	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **I Transponder-Mode S**	Letter I indicates Transponder Mode S, including aircraft identification, but with no pressure altitude capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **L Transponder Mode S**	Letter L in the new format indicates Transponder Mode S, pressure altitude, extended squitter (ADS-B) and enhanced surveillance capabilities	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept the letter L	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **X Transponder Mode S**	Letter X in the new format indicates Transponder Mode S, with no aircraft identification or pressure altitude capability.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template would not accept the letter X	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **ADS-B B1 and B2** **B1**: ADS-B with specialised 1090Mhz ADS-B out capability **B2**: ADS-B with specialised 1090Mhz ADS-B out and ADS-B in capability **U1 and U2** **U1**: ADS-B out capability using UAT **U2**: ADS-B out and in capability using UAT **V1 and V2** **V1**: ADS-B out capability using VDL-4 **V2**: ADS B out and in capability using VDL-4	Letters B, U, and V indicate new capabilities for ADS-B depending whether the equipment broadcasts in 1090Mhz, UAT, or VDL 4. Numbers are inserted next to the letters to identify ADS-B out and ADS-B out and in capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	No effect	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-C D1 and G1** **D1**: ADS-C with FANS1/A capabilities **G1**: ADS–C with ATN capabilities	D and G are new letters to which a numeric value is added, and indicate ADS-C with FANS1/A capabilities and ADS-C with ATN capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	No effect	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 15 Marking and distance route with respect of a significant point	The identification of a significant point followed by a 3 digit mark from the point, giving the magnetical degrees, followed by the distance from the point, with 3 digits expressing nautical miles	No effect	No effect	Affects: The FDP accepts the information and generates a "command accepted" message; nevertheless, the system will consider this significant point outside of the FIR involved	No effect	No effect	No effect
Item 18 SUR/ indicator	Additional surveillance applications should be listed in Item 18 after the SUR/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **STS/ indicator** **ALTRV** **ATFMX** **FFR** **FLTCK**	The reason for special management by ATS, for instance search and rescue mission, as follows: **ALTRV**: for a flight conducted according to an altitude reservation **ATFMX**: for a flight whose exemption from ATFM measures has been approved by the appropriate ATS authorities **FFR**: Fire fighting **FLTCK**: flight check for calibration of navigation aid.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **STS/ indicator** **HAZMAT** **HEAD** **HOSP**	**HAZMAT**: for a flight carrying hazardous material **HEAD**: a flight with Head of State status **HOSP**: for a medical flight declared by the medical authorities.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **STS/ indicator HUM MARSA MEDEVAC NONRVSM**	**HUM**: for a flight conducting a humanitarian mission. **MARSA**: for a flight for which a military entity assumes the responsibility for its separation from military aircraft **MEDEVAC**: for a medical emergency evacuation that is critical to save lives. **NONRVSM**: For a flight that has no RVSM capability and intends to operate in RVSM airspace.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	
Item 18 (Cont.) **STS/ indicator SAR STATE**	**SAR**: for a flight conducting a search and rescue mission **STATE**: for a flight performing military customs or police services.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 PBN/ indicator RNAV specification **A1**: RNAV10 (RNP10) **B1**: RNAV5 All of the allowed sensors **B2**: RNAV5 GNSS **B3**: RNAV5 DME/DME **B4**: RNAV5 VOR/DME **B5**: RNAV5 INS or IRS **B6**: RNAV5 LORAN C	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNAV specification** **C1:** RNAV2 with all sensors **C2:** RNAV2 with GNSS **C3:** RNAV2 DME/DME **C4:** RNAV2 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNAV specification** **D1:** RNAV 1 with all sensors **D2:** RNAV1 GNSS **D3:** RNAV1 DME/DME **D4:** RNAV1 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **(**Cont.) **PBN/ indicator RNP specification** **L1**: RNP-4 **O1**: Basic RNP with all allowed sensors **O2**: Basic RNPGNSS **O3**: Basic RNP 1 DME DME **O4**: Basic RNP1 DME/DME /IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **PBN/ indicator RNP specification** **S1:** RNP APPCH **S2:** RNP APPCH with Baro VNAV	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **PBN/ indicator RNP specification** **T1**: RNP AR APPCH with RF **T2**: RNP AR APPCH without RF	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 DLE/ indicator	**DLE** New indicator related to en-route delay or holding. En-route significant points where delay is expected to occur are to be inserted, followed by the duration of the delay, using four digits for time, in hours and minutes.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 ORGN/ indicator	The 8-letter AFTN address of the originator and other details of the appropriate contact, when the flight plan originator cannot be easily identified as stipulated by the appropriate authority.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 TALT/ indicator	Four-letter ICAO indicators for alternate take-off aerodromes as specified in Location Indicators, Doc 7910 or the name of the alternate en-route aerodromes if no indicator is assigned. For aerodromes not listed in the relevant aeronautical information publication, indicate the location in LAT/LONG or bearing and distance with respect to the closest significant point as described in DEP/.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 DOF/ indicator	Date of departure of the flight in a six-digit format (YYMMDD), where AA is the year, MM the month, and DD is the day.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

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* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

ATTACHMENT C TO APPENDIX D

TENTATIVE ANALYSIS OF THE IMPACT OF THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE 15TH EDITION OF ICAO DOCUMENT 4444) ON AUTOMATED FLIGHT PLAN PROCESSING SYSTEMS – CHILE/SANTIAGO ACC

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Flight Plan Form Item 7: Aircraft identification (7 characters maximum)	Alphanumeric characters with no hyphens or symbols will be used for aircraft identification	No effect. The Chile AMHS, even though implemented is NOT operational and requires adjusments, still pending action from the provider	N/A: RPL is not used in Chile (users fill FPL on line through the IFIS system). In addition, the new EUROCAT C system presents facilities that would be required for the dealing of the RPL.	No effect.	No effect.	No effect.	No effect.
Flight Plan Form Item 8: Flight rules and flight types (one or two characters)	a) The classes of flight rules that the pilot intends to apply are more clearly described (I, V, Y, Z). b) The letters for identifying the flight type are maintained, and it is indicated that the flight status must be specified in Item 18 after the STS indicator or when neessary to indicate other reasons after the RMK indicator.	a) and b) no change, no effect.	N/A	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
  Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **Equipment and Capabilities** **A** GBAS landing system	Letter A is assigned to the GBAS landing system. There was no previous assignment for this letter.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numbers nor letters ABENPQS	N/A	No effect.	No effect.	No effect.	No effect.
Item 10 **(**Part A)* **B** LPV (APV with SBAS)	Letter B is assigned to specify an LPV-capable aircraft (APV with SBAS). There was no previous assignment for this letter.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numbers nor letters ABENPQS	N/A	No effect.	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **E1, E2 and E3** **E1**: ACARS FMC WPR **E2**: ACARS D-FIS **E3**: ACARS PDC	Letter E had not been assigned before. A numeric value is inserted next to letter E.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **J1, J2, J3, J4, J5, J6 and J7** **J1**: CPDLC ATN VDL Mode 2 **J2**: CPDLC FANS 1/A HFDL **J3**: CPDLC FANS1/A VDL Mode A **J4**: CPDLC FANS1/A VDL Mode 2 **J5**: CPDLC FANS1/A SATCOM (INMARSAT) **J6**: CPDLC FANS/1/A SATCOM (MTSAT) **J7**: CPDLC FANS 1/A SATCOM (Iridium)	A numerical value is inserted in addition to letter J, and letter J, which originally identified data link, now identifies the various means for CPDLC.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **M1, M2 and M3** **M1**: ATC RTF SATCOM (INMARSAT) **M2**: ATC RTF (MTSAT) **M3**: ATC RTF (Iridium)	Letter M is associated to satellite RTF. A number identifying the satellite system used is inserted next to letter M.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **P1-P9** Reserved for RCP	Letter P links communication performance requirements. A number is inserted next to letter P to identify the various performance requirements.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **R** Approved PBN	Letter R is associated to the approved PBN, and was previously associated to RNP type certification. When letter R is used, PBN values reached are specified in Item 18 after the PBN/ indicator.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **W** Approved RVSM	Letter W is assigned to identify RVSM approval.	No effect	N/A	No effect	No effect	No effect	No effect
Item 10 (Part A)* **X** Approved MNPS	Letter X is assigned to identify MNPS.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Y** VHF with 8.33Khz separation capability	Letter Y is assigned to identify the capability of the VHF system to operate with a 8.33 Khz separation.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Z** Other equipment installed on board or other capabilities	In addition to other equipment installed on board, the term for other capabilities is also inserted. Other equipment or capabilities must be specified in the flight plan, in Item 18, after a new DAT/ indicator.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **E Transponder-Mode S**	Letter E indicates: Transponder Mode S, including aircraft identification, pressure altitude, and extended squitter capability (ADS-B).	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept the letter E	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **H Transponder-Mode S**	Letter H indicates Transponder Mode S, including aircraft identification, pressure altitude, and improved surveillance capability.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **I Transponder-Mode S**	Letter I indicates Transponder Mode S, including aircraft identification, but with no pressure altitude capability.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **L Transponder Mode S**	Letter L in the new format indicates Transponder Mode S, pressure altitude, extended squitter (ADS-B) and enhanced surveillance capabilities	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **X Transponder Mode S**	Letter X in the new format indicates Transponder Mode S, with no aircraft identification or pressure altitude capability.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template would not accept the letter X	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **ADS-B B1 and B2** **B1**: ADS-B with specialised 1090Mhz ADS-B out capability **B2**: ADS-B with specialised 1090Mhz ADS-B out and ADS-B in capability **U1 and U2** **U1**: ADS-B out capability using UAT **U2**: ADS-B out and in capability using UAT **V1 and V2** **V1**: ADS-B out capability using VDL-4 **V2**: ADS B out and in capability using VDL-4	Letters B, U, and V indicate new capabilities for ADS-B depending whether the equipment broadcasts in 1090Mhz, UAT, or VDL 4. Numbers are inserted next to the letters to identify ADS-B out and ADS-B out and in capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values (neither numerical characters nor letters ABENPQS)	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-C D1 and G1** **D1**: ADS-C with FANS1/A capabilities **G1**: ADS–C with ATN capabilities	D and G are new letters to which a numeric value is added, and indicate ADS-C with FANS1/A capabilities and ADS-C with ATN capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	N/A	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 15 Marking and distance route with respect of a significant point	The identification of a significant point followed by a 3 digit mark from the point, giving the magnetical degrees, followed by the distance from the point, with 3 digits expressing nautical miles	No effect	N/A	Affects: The FDP does not accept, it generates an “error in syntaxis” message” and places the cursor over the corresponding text	No effect	No effect	No effect
Item 18 SUR/ indicator	Additional surveillance applications should be listed in Item 18 after the SUR/ indicator.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **STS/ indicator** **ALTRV** **ATFMX** **FFR** **FLTCK**	The reason for special management by ATS, for instance search and rescue mission, as follows: **ALTRV**: for a flight conducted according to an altitude reservation **ATFMX**: for a flight whose exemption from ATFM measures has been approved by the appropriate ATS authorities **FFR**: Fire fighting **FLTCK**: flight check for calibration of navigation aid.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **STS/ indicator** **HAZMAT** **HEAD** **HOSP**	**HAZMAT**: for a flight carrying hazardous material **HEAD**: a flight with Head of State status **HOSP**: for a medical flight declared by the medical authorities.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **STS/ indicator** **HUM** **MARSA** **MEDEVAC** **NONRVSM**	**HUM**: for a flight conducting a humanitarian mission. **MARSA**: for a flight for which a military entity assumes the responsibility for its separation from military aircraft **MEDEVAC**: for a medical emergency evacuation that is critical to save lives. **NONRVSM**: For a flight that has no RVSM capability and intends to operate in RVSM airspace.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	
Item 18 (Cont.) **STS/ indicator** **SAR** **STATE**	**SAR**: for a flight conducting a search and rescue mission **STATE**: for a flight performing military customs or police services.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 PBN/ indicator RNAV specification **A1**: RNAV10 (RNP10) **B1**: RNAV5 All of the allowed sensors **B2**: RNAV5 GNSS **B3**: RNAV5 DME/DME **B4**: RNAV5 VOR/DME **B5**: RNAV5 INS or IRS **B6**: RNAV5 LORAN C	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNAV specification** **C1:** RNAV2 with all sensors **C2:** RNAV2 with GNSS **C3:** RNAV2 DME/DME **C4:** RNAV2 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNAV specification** **D1:** RNAV 1 with all sensors **D2:** RNAV1 GNSS **D3:** RNAV1 DME/DME **D4:** RNAV1 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNP specification** **L1**: RNP-4 **O1**: Basic RNP with all allowed sensors **O2**: Basic RNPGNSS **O3**: Basic RNP 1 DME DME **O4**: Basic RNP1 DME/DME /IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNP specification** **S1:** RNP APPCH **S2:** RNP APPCH with Baro VNAV	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNP specification** **T1**: RNP AR APPCH with RF **T2**: RNP AR APPCH without RF	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 DLE/ indicator	**DLE** New indicator related to en-route delay or holding. En-route significant points where delay is expected to occur are to be inserted, followed by the duration of the delay, using four digits for time, in hours and minutes.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 ORGN/ indicator	The 8-letter AFTN address of the originator and other details of the appropriate contact, when the flight plan originator cannot be easily identified as stipulated by the appropriate authority.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 TALT/ indicator	Four-letter ICAO indicators for alternate take-off aerodromes as specified in Location Indicators, Doc 7910 or the name of the alternate en-route aerodromes if no indicator is assigned. For aerodromes not listed in the relevant aeronautical information publication, indicate the location in LAT/LONG or bearing and distance with respect to the closest significant point as described in DEP/.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 DOF/ indicator	Date of departure of the flight in a six-digit format (YYMMDD), where AA is the year, MM the month, and DD is the day.	No effect	N/A	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

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* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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ATTACHMENT D TO APPENDIX D

TENTATIVE ANALYSIS OF THE IMPACT OF THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE 15TH EDITION OF ICAO DOCUMENT 4444) ON AUTOMATED FLIGHT PLAN PROCESSING SYSTEMS – COLOMBIA/BOGOTA ACC

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Flight Plan Form Item 7: Aircraft identification (7 characters maximum)	Alphanumeric characters with no hyphens or symbols will be used for aircraft identification	No effect.	No effect	No effect.	No effect.	No effect.	No effect.
Flight Plan Form Item 8: Flight rules and flight types (one or two characters)	a) The classes of flight rules that the pilot intends to apply are more clearly described (I, V, Y, Z). b) The letters for identifying the flight type are maintained, and it is indicated that the flight status must be specified in Item 18 after the STS indicator or when neessary to indicate other reasons after the RMK indicator.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **Equipment and Capabilities** **A** GBAS landing system	Letter A is assigned to the GBAS landing system. There was no previous assignment for this letter.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Item 10 **(**Part A)* **B** LPV (APV with SBAS)	Letter B is assigned to specify an LPV-capable aircraft (APV with SBAS). There was no previous assignment for this letter.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **E1, E2 and E3** **E1**: ACARS FMC WPR **E2**: ACARS D-FIS **E3**: ACARS PDC	Letter E had not been assigned before. A numeric value is inserted next to letter E.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **J1, J2, J3, J4, J5, J6 and J7** **J1**: CPDLC ATN VDL Mode 2 **J2**: CPDLC FANS 1/A HFDL **J3**: CPDLC FANS1/A VDL Mode A **J4**: CPDLC FANS1/A VDL Mode 2 **J5**: CPDLC FANS1/A SATCOM (INMARSAT) **J6**: CPDLC FANS/1/A SATCOM (MTSAT) **J7**: CPDLC FANS 1/A SATCOM (Iridium)	A numerical value is inserted in addition to letter J, and letter J, which originally identified data link, now identifies the various means for CPDLC.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **M1, M2 and M3** **M1**: ATC RTF SATCOM (INMARSAT) **M2**: ATC RTF (MTSAT) **M3**: ATC RTF (Iridium)	Letter M is associated to satellite RTF. A number identifying the satellite system used is inserted next to letter M.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **P1-P9** Reserved for RCP	Letter P links communication performance requirements. A number is inserted next to letter P to identify the various performance requirements.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **R** Approved PBN	Letter R is associated to the approved PBN, and was previously associated to RNP type certification. When letter R is used, PBN values reached are specified in Item 18 after the PBN/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **W** Approved RVSM	Letter W is assigned to identify RVSM approval.	No effect	N effect	No effect	No effect	No effect	No effect
Item 10 **(**Part A)* **X** Approved MNPS	Letter X is assigned to identify MNPS.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Y** VHF with 8.33Khz separation capability	Letter Y is assigned to identify the capability of the VHF system to operate with a 8.33 Khz separation.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Z** Other equipment installed on board or other capabilities	In addition to other equipment installed on board, the term for other capabilities is also inserted. Other equipment or capabilities must be specified in the flight plan, in Item 18, after a new DAT/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **E Transponder-Mode S**	Letter E indicates: Transponder Mode S, including aircraft identification, pressure altitude, and extended squitter capability (ADS-B).	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **H Transponder-Mode S**	Letter H indicates Transponder Mode S, including aircraft identification, pressure altitude, and improved surveillance capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **I Transponder-Mode S**	Letter I indicates Transponder Mode S, including aircraft identification, but with no pressure altitude capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **L Transponder Mode S**	Letter L in the new format indicates Transponder Mode S, pressure altitude, extended squitter (ADS-B) and enhanced surveillance capabilities	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **X Transponder Mode S**	Letter X in the new format indicates Transponder Mode S, with no aircraft identification or pressure altitude capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-B B1 and B2** **B1**: ADS-B with specialised 1090Mhz ADS-B out capability **B2**: ADS-B with specialised 1090Mhz ADS-B out and ADS-B in capability **U1 and U2** **U1**: ADS-B out capability using UAT **U2**: ADS-B out and in capability using UAT **V1 and V2** **V1**: ADS-B out capability using VDL-4 **V2**: ADS B out and in capability using VDL-4	Letters B, U, and V indicate new capabilities for ADS-B depending whether the equipment broadcasts in 1090Mhz, UAT, or VDL 4. Numbers are inserted next to the letters to identify ADS-B out and ADS-B out and in capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values (neither numerical characters nor letters ABENPQS)	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-C D1 and G1** **D1**: ADS-C with FANS1/A capabilities **G1**: ADS–C with ATN capabilities	D and G are new letters to which a numeric value is added, and indicate ADS-C with FANS1/A capabilities and ADS-C with ATN capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 18 SUR/ indicator	Additional surveillance applications should be listed in Item 18 after the SUR/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **STS/ indicator** **ALTRV** **ATFMX** **FFR** **FLTCK**	The reason for special management by ATS, for instance search and rescue mission, as follows: **ALTRV**: for a flight conducted according to an altitude reservation **ATFMX**: for a flight whose exemption from ATFM measures has been approved by the appropriate ATS authorities **FFR**: Fire fighting **FLTCK**: flight check for calibration of navigation aid.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **STS/ indicator** **HAZMAT** **HEAD** **HOSP**	**HAZMAT**: for a flight carrying hazardous material **HEAD**: a flight with Head of State status **HOSP**: for a medical flight declared by the medical authorities.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **STS/ indicator HUM MARSA MEDEVAC NONRVSM**	**HUM**: for a flight conducting a humanitarian mission. **MARSA**: for a flight for which a military entity assumes the responsibility for its separation from military aircraft **MEDEVAC**: for a medical emergency evacuation that is critical to save lives. **NONRVSM**: For a flight that has no RVSM capability and intends to operate in RVSM airspace.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **STS/ indicator SAR STATE**	**SAR**: for a flight conducting a search and rescue mission **STATE**: for a flight performing military customs or police services.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **PBN/ indicator RNAV specification** **A1**: RNAV10 (RNP10) **B1**: RNAV5 All of the allowed sensors **B2**: RNAV5 GNSS **B3**: RNAV5 DME/DME **B4**: RNAV5 VOR/DME **B5**: RNAV5 INS or IRS **B6**: RNAV5 LORAN C	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNAV specification** **C1:** RNAV2 with all sensors **C2:** RNAV2 with GNSS **C3:** RNAV2 DME/DME **C4:** RNAV2 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNAV specification** **D1:** RNAV 1 with all sensors **D2:** RNAV1 GNSS **D3:** RNAV1 DME/DME **D4:** RNAV1 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNP specification** **L1**: RNP-4 **O1**: Basic RNP with all allowed sensors **O2**: Basic RNPGNSS **O3**: Basic RNP 1 DME DME **O4**: Basic RNP1 DME/DME /IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNP specification** **S1:** RNP APPCH **S2:** RNP APPCH with Baro VNAV	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNP specification** **T1**: RNP AR APPCH with RF **T2**: RNP AR APPCH without RF	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 DLE/ indicator	**DLE** New indicator related to en-route delay or holding. En-route significant points where delay is expected to occur are to be inserted, followed by the duration of the delay, using four digits for time, in hours and minutes.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 ORGN/ indicator	The 8-letter AFTN address of the originator and other details of the appropriate contact, when the flight plan originator cannot be easily identified as stipulated by the appropriate authority.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 TALT/ indicator	Four-letter ICAO indicators for alternate take-off aerodromes as specified in Location Indicators, Doc 7910 or the name of the alternate en-route aerodromes if no indicator is assigned. For aerodromes not listed in the relevant aeronautical information publication, indicate the location in LAT/LONG or bearing and distance with respect to the closest significant point as described in DEP/.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 DOF/ indicator	Date of departure of the flight in a six-digit format (YYMMDD), where AA is the year, MM the month, and DD is the day.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

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* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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ATTACHMENT E TO APPENDIX D

TENTATIVE ANALYSIS OF THE IMPACT OF THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE 15TH EDITION OF ICAO DOCUMENT 4444) ON AUTOMATED FLIGHT PLAN PROCESSING SYSTEMS – PANAMA/PANAMA ACC

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Flight Plan Form Item 7: Aircraft identification (7 characters maximum)	Alphanumeric characters with no hyphens or symbols will be used for aircraft identification	No effect.	No effect	No effect.	No effect.	No effect.	No effect.
Flight Plan Form Item 8: Flight rules and flight types (one or two characters)	a) The classes of flight rules that the pilot intends to apply are more clearly described (I, V, Y, Z). b) The letters for identifying the flight type are maintained, and it is indicated that the flight status must be specified in Item 18 after the STS indicator or when neessary to indicate other reasons after the RMK indicator.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **Equipment and Capabilities** **A** GBAS landing system	Letter A is assigned to the GBAS landing system. There was no previous assignment for this letter.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect.	No effect.	No effect.	No effect.
Item 10 **(**Part A)* **B** LPV (APV with SBAS)	Letter B is assigned to specify an LPV-capable aircraft (APV with SBAS). There was no previous assignment for this letter.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect.	No effect.	No effect.	No effect.

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **E1, E2 and E3** **E1**: ACARS FMC WPR **E2**: ACARS D-FIS **E3**: ACARS PDC	Letter E had not been assigned before. A numeric value is inserted next to letter E.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect.	No effect.	No effect.	No effect.
Item 10 (Part A)* **J1, J2, J3, J4, J5, J6 and J7** **J1**: CPDLC ATN VDL Mode 2 **J2**: CPDLC FANS 1/A HFDL **J3**: CPDLC FANS1/A VDL Mode A **J4**: CPDLC FANS1/A VDL Mode 2 **J5**: CPDLC FANS1/A SATCOM (INMARSAT) **J6**: CPDLC FANS/1/A SATCOM (MTSAT) **J7**: CPDLC FANS 1/A SATCOM (Iridium)	A numerical value is inserted in addition to letter J, and letter J, which originally identified data link, now identifies the various means for CPDLC.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect	No effect.	No effect.	No effect.

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **M1, M2 and M3** **M1**: ATC RTF SATCOM (INMARSAT) **M2**: ATC RTF (MTSAT) **M3**: ATC RTF (Iridium)	Letter M is associated to satellite RTF. A number identifying the satellite system used is inserted next to letter M.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect	No effect.	No effect.	No effect.
Item 10 (Part A)* **P1-P9** Reserved for RCP	Letter P links communication performance requirements. A number is inserted next to letter P to identify the various performance requirements.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect	No effect.	No effect.	No effect.
Item 10 (Part A)* **R** Approved PBN	Letter R is associated to the approved PBN, and was previously associated to RNP type certification. When letter R is used, PBN values reached are specified in Item 18 after the PBN/ indicator.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect	No effect.	No effect.	No effect.
Item 10 (Part A)* **W** Approved RVSM	Letter W is assigned to identify RVSM approval.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **X** Approved MNPS	Letter X is assigned to identify MNPS.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect	No effect.	No effect.	No effect.
Item 10 (Part A)* **Y** VHF with 8.33Khz separation capability	Letter Y is assigned to identify the capability of the VHF system to operate with a 8.33 Khz separation.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect	No effect.	No effect.	No effect.
Item 10 (Part A)* **Z** Other equipment installed on board or other capabilities	In addition to other equipment installed on board, the term for other capabilities is also inserted. Other equipment or capabilities must be specified in the flight plan, in Item 18, after a new DAT/ indicator.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect	No effect.	No effect.	No effect.
Item 10 (Part B)* **E Transponder-Mode S**	Letter E indicates: Transponder Mode S, including aircraft identification, pressure altitude, and extended squitter capability (ADS-B).	No effect. The flight plan template does not contain the letter E	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect	No effect.	No effect.	No effect.

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **H Transponder-Mode S**	Letter H indicates Transponder Mode S, including aircraft identification, pressure altitude, and improved surveillance capability.	No effect. The flight plan template does not contain the letter H	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect	No effect.	No effect.	No effect.
Item 10 (Part B)* **I Transponder-Mode S**	Letter I indicates Transponder Mode S, including aircraft identification, but with no pressure altitude capability.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect	No effect.	No effect.	No effect.
Item 10 (Part B)* **L Transponder Mode S**	Letter L in the new format indicates Transponder Mode S, pressure altitude, extended squitter (ADS-B) and enhanced surveillance capabilities	No effect. The flight plan template does not contain the letter L	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect	No effect.	No effect.	No effect.
Item 10 (Part B)* **X Transponder Mode S**	Letter X in the new format indicates Transponder Mode S, with no aircraft identification or pressure altitude capability.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-B** **B1 and B2** **B1**: ADS-B with specialised 1090Mhz ADS-B out capability **B2**: ADS-B with specialised 1090Mhz ADS-B out and ADS-B in capability **U1 and U2** **U1**: ADS-B out capability using UAT **U2**: ADS-B out and in capability using UAT **V1 and V2** **V1**: ADS-B out capability using VDL-4 **V2**: ADS B out and in capability using VDL-4	Letters B, U, and V indicate new capabilities for ADS-B depending whether the equipment broadcasts in 1090Mhz, UAT, or VDL 4. Numbers are inserted next to the letters to identify ADS-B out and ADS-B out and in capabilities.	No effect. The flight plan template does not contain the leter and number (numerical alphabet) combinations	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect	No effect.	No effect.	No effect.
Item 10 (Part B)* **ADS-C** **D1 and G1** **D1**: ADS-C with FANS1/A capabilities **G1**: ADS–C with ATN capabilities	D and G are new letters to which a numeric value is added, and indicate ADS-C with FANS1/A capabilities and ADS-C with ATN capabilities.	No effect. The flight plan template does not contain the leter and number (numerical alphabet) combinations	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	Does affect	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **SUR/ indicator**	Additional surveillance applications should be listed in Item 18 after the SUR/ indicator.	No effect.	The current format takes Item 10 into consideration, but upon using Item Q, there will be an effect.	No effect	No effect.	No effect.	No effect.
Item 18 **STS/ indicator** **ALTRV** **ATFMX** **FFR** **FLTCK**	The reason for special management by ATS, for instance search and rescue mission, as follows: **ALTRV**: for a flight conducted according to an altitude reservation **ATFMX**: for a flight whose exemption from ATFM measures has been approved by the appropriate ATS authorities **FFR**: Fire fighting **FLTCK**: flight check for calibration of navigation aid.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect
Item 18 **(**Cont.) **STS/ indicator** **HAZMAT** **HEAD** **HOSP**	**HAZMAT**: for a flight carrying hazardous material **HEAD**: a flight with Head of State status **HOSP**: for a medical flight declared by the medical authorities.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **STS/ indicator HUM MARSA MEDEVAC NONRVSM**	**HUM**: for a flight conducting a humanitarian mission. **MARSA**: for a flight for which a military entity assumes the responsibility for its separation from military aircraft **MEDEVAC**: for a medical emergency evacuation that is critical to save lives. **NONRVSM**: For a flight that has no RVSM capability and intends to operate in RVSM airspace.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect
Item 18 (Cont.) **STS/ indicator SAR STATE**	**SAR**: for a flight conducting a search and rescue mission **STATE**: for a flight performing military customs or police services.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **PBN/ indicator RNAV specification** **A1**: RNAV10 (RNP10) **B1**: RNAV5 All of the allowed sensors **B2**: RNAV5 GNSS **B3**: RNAV5 DME/DME **B4**: RNAV5 VOR/DME **B5**: RNAV5 INS or IRS **B6**: RNAV5 LORAN C	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNAV specification** **C1:** RNAV2 with all sensors **C2:** RNAV2 with GNSS **C3:** RNAV2 DME/DME **C4:** RNAV2 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect
Item 18 (Cont.) **PBN/ indicator RNAV specification** **D1:** RNAV 1 with all sensors **D2:** RNAV1 GNSS **D3:** RNAV1 DME/DME **D4:** RNAV1 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator** **RNP specification** **L1**: RNP-4 **O1**: Basic RNP with all allowed sensors **O2**: Basic RNPGNSS **O3**: Basic RNP 1 DME DME **O4**: Basic RNP1 DME/DME /IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect
Item 18 (Cont.) **PBN/ indicator** **RNP specification** **S1:** RNP APPCH **S2:** RNP APPCH with Baro VNAV	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect
Item 18 (Cont.) **PBN/ indicator** **RNP specification** **T1**: RNP AR APPCH with RF **T2**: RNP AR APPCH without RF	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 DLE/ indicator	**DLE** New indicator related to en-route delay or holding. En-route significant points where delay is expected to occur are to be inserted, followed by the duration of the delay, using four digits for time, in hours and minutes.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect
Item 18 ORGN/ indicator	The 8-letter AFTN address of the originator and other details of the appropriate contact, when the flight plan originator cannot be easily identified as stipulated by the appropriate authority.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 TALT/ indicator	Four-letter ICAO indicators for alternate take-off aerodromes as specified in Location Indicators, Doc 7910 or the name of the alternate en-route aerodromes if no indicator is assigned. For aerodromes not listed in the relevant aeronautical information publication, indicate the location in LAT/LONG or bearing and distance with respect to the closest significant point as described in DEP/.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect
Item 18 DOF/ indicator	Date of departure of the flight in a six-digit format (YYMMDD), where AA is the year, MM the month, and DD is the day.	No effect	No effect, since information in Item 18 does not appear in the RPL format	No effect	No effect	No effect:	No effect

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* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

ATTACHMENT F TO APPENDIX D

TENTATIVE ANALYSIS OF THE IMPACT OF THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE 15TH EDITION OF ICAO DOCUMENT 4444) ON AUTOMATED FLIGHT PLAN PROCESSING SYSTEMS – VENEZUELA/MAIQUETIA ACC

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Flight Plan Form Item 7: Aircraft identification (7 characters maximum)	Alphanumeric characters with no hyphens or symbols will be used for aircraft identification	No effect.	No effect	No effect.	No effect.	No effect.	No effect.
Flight Plan Form Item 8: Flight rules and flight types (one or two characters)	a) The classes of flight rules that the pilot intends to apply are more clearly described (I, V, Y, Z). b) The letters for identifying the flight type are maintained, and it is indicated that the flight status must be specified in Item 18 after the STS indicator or when neessary to indicate other reasons after the RMK indicator.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
  Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **Equipment and Capabilities** **A** GBAS landing system	Letter A is assigned to the GBAS landing system. There was no previous assignment for this letter.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Item 10 **(**Part A)* **B** LPV (APV with SBAS)	Letter B is assigned to specify an LPV-capable aircraft (APV with SBAS). There was no previous assignment for this letter.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **E1, E2 and E3** **E1**: ACARS FMC WPR **E2**: ACARS D-FIS **E3**: ACARS PDC	Letter E had not been assigned before. A numeric value is inserted next to letter E.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **J1, J2, J3, J4, J5, J6 and J7** **J1**: CPDLC ATN VDL Mode 2 **J2**: CPDLC FANS 1/A HFDL **J3**: CPDLC FANS1/A VDL Mode A **J4**: CPDLC FANS1/A VDL Mode 2 **J5**: CPDLC FANS1/A SATCOM (INMARSAT) **J6**: CPDLC FANS/1/A SATCOM (MTSAT) **J7**: CPDLC FANS 1/A SATCOM (Iridium)	A numerical value is inserted in addition to letter J, and letter J, which originally identified data link, now identifies the various means for CPDLC.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **M1, M2 and M3** **M1**: ATC RTF SATCOM (INMARSAT) **M2**: ATC RTF (MTSAT) **M3**: ATC RTF (Iridium)	Letter M is associated to satellite RTF. A number identifying the satellite system used is inserted next to letter M.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **P1-P9** Reserved for RCP	Letter P links communication performance requirements. A number is inserted next to letter P to identify the various performance requirements.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **R** Approved PBN	Letter R is associated to the approved PBN, and was previously associated to RNP type certification. When letter R is used, PBN values reached are specified in Item 18 after the PBN/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **W** Approved RVSM	Letter W is assigned to identify RVSM approval.	No effect	N effect	No effect	No effect	No effect	No effect
Item 10 (Part A)* **X** Approved MNPS	Letter X is assigned to identify MNPS.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Y** VHF with 8.33Khz separation capability	Letter Y is assigned to identify the capability of the VHF system to operate with a 8.33 Khz separation.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Z** Other equipment installed on board or other capabilities	In addition to other equipment installed on board, the term for other capabilities is also inserted. Other equipment or capabilities must be specified in the flight plan, in Item 18, after a new DAT/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **E Transponder-Mode S**	Letter E indicates: Transponder Mode S, including aircraft identification, pressure altitude, and extended squitter capability (ADS-B).	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **H Transponder-Mode S**	Letter H indicates Transponder Mode S, including aircraft identification, pressure altitude, and improved surveillance capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **I Transponder-Mode S**	Letter I indicates Transponder Mode S, including aircraft identification, but with no pressure altitude capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **L Transponder Mode S**	Letter L in the new format indicates Transponder Mode S, pressure altitude, extended squitter (ADS-B) and enhanced surveillance capabilities	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **X Transponder Mode S**	Letter X in the new format indicates Transponder Mode S, with no aircraft identification or pressure altitude capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-B** **B1 and B2** **B1**: ADS-B with specialised 1090Mhz ADS-B out capability **B2**: ADS-B with specialised 1090Mhz ADS-B out and ADS-B in capability **U1 and U2** **U1**: ADS-B out capability using UAT **U2**: ADS-B out and in capability using UAT **V1 and V2** **V1**: ADS-B out capability using VDL-4 **V2**: ADS B out and in capability using VDL-4	Letters B, U, and V indicate new capabilities for ADS-B depending whether the equipment broadcasts in 1090Mhz, UAT, or VDL 4. Numbers are inserted next to the letters to identify ADS-B out and ADS-B out and in capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values (neither numerical characters nor letters ABENPQS)	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-C D1 and G1** **D1**: ADS-C with FANS1/A capabilities **G1**: ADS–C with ATN capabilities	D and G are new letters to which a numeric value is added, and indicate ADS-C with FANS1/A capabilities and ADS-C with ATN capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 18 SUR/ indicator	Additional surveillance applications should be listed in Item 18 after the SUR/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **STS/ indicator** **ALTRV** **ATFMX** **FFR** **FLTCK**	The reason for special management by ATS, for instance search and rescue mission, as follows: **ALTRV**: for a flight conducted according to an altitude reservation **ATFMX**: for a flight whose exemption from ATFM measures has been approved by the appropriate ATS authorities **FFR**: Fire fighting **FLTCK**: flight check for calibration of navigation aid.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **STS/ indicator** **HAZMAT** **HEAD** **HOSP**	**HAZMAT**: for a flight carrying hazardous material **HEAD**: a flight with Head of State status **HOSP**: for a medical flight declared by the medical authorities.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **STS/ indicator HUM MARSA MEDEVAC NONRVSM**	**HUM**: for a flight conducting a humanitarian mission. **MARSA**: for a flight for which a military entity assumes the responsibility for its separation from military aircraft **MEDEVAC**: for a medical emergency evacuation that is critical to save lives. **NONRVSM**: For a flight that has no RVSM capability and intends to operate in RVSM airspace.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	
Item 18 (Cont.) **STS/ indicator SAR STATE**	**SAR**: for a flight conducting a search and rescue mission **STATE**: for a flight performing military customs or police services.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 PBN/ indicator RNAV specification **A1**: RNAV10 (RNP10) **B1**: RNAV5 All of the allowed sensors **B2**: RNAV5 GNSS **B3**: RNAV5 DME/DME **B4**: RNAV5 VOR/DME **B5**: RNAV5 INS or IRS **B6**: RNAV5 LORAN C	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
  Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNAV specification** **C1:** RNAV2 with all sensors **C2:** RNAV2 with GNSS **C3:** RNAV2 DME/DME **C4:** RNAV2 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **PBN/ indicator RNAV specification** **D1:** RNAV 1 with all sensors **D2:** RNAV1 GNSS **D3:** RNAV1 DME/DME **D4:** RNAV1 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator** **RNP specification** **L1**: RNP-4 **O1**: Basic RNP with all allowed sensors **O2**: Basic RNPGNSS **O3**: Basic RNP 1 DME DME **O4**: Basic RNP1 DME/DME /IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator** **RNP specification** **S1:** RNP APPCH **S2:** RNP APPCH with Baro VNAV	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator** **RNP specification** **T1**: RNP AR APPCH with RF **T2**: RNP AR APPCH without RF	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 DLE/ indicator	**DLE** New indicator related to en-route delay or holding. En-route significant points where delay is expected to occur are to be inserted, followed by the duration of the delay, using four digits for time, in hours and minutes.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 ORGN/ indicator	The 8-letter AFTN address of the originator and other details of the appropriate contact, when the flight plan originator cannot be easily identified as stipulated by the appropriate authority.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 TALT/ indicator	Four-letter ICAO indicators for alternate take-off aerodromes as specified in Location Indicators, Doc 7910 or the name of the alternate en-route aerodromes if no indicator is assigned. For aerodromes not listed in the relevant aeronautical information publication, indicate the location in LAT/LONG or bearing and distance with respect to the closest significant point as described in DEP/.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 DOF/ indicator	Date of departure of the flight in a six-digit format (YYMMDD), where AA is the year, MM the month, and DD is the day.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

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* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

ATTACHMENT G TO APPENDIX D

TENTATIVE ANALYSIS OF THE IMPACT OF THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE 15TH EDITION OF ICAO DOCUMENT 4444) ON AUTOMATED FLIGHT PLAN PROCESSING SYSTEMS – ECUADOR/GUAYAQUIL ACC AND QUITO APP

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Flight Plan Form Item 7: Aircraft identification (7 characters maximum)	Alphanumeric characters with no hyphens or symbols will be used for aircraft identification	No effect.	No effect	No effect.	No effect.	No effect.	No effect.
Flight Plan Form Item 8: Flight rules and flight types (one or two characters)	a) The classes of flight rules that the pilot intends to apply are more clearly described (I, V, Y, Z). b) The letters for identifying the flight type are maintained, and it is indicated that the flight status must be specified in Item 18 after the STS indicator or when neessary to indicate other reasons after the RMK indicator.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **Equipment and Capabilities** **A** GBAS landing system	Letter A is assigned to the GBAS landing system. There was no previous assignment for this letter.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Item 10 **(**Part A)* **B** LPV (APV with SBAS)	Letter B is assigned to specify an LPV-capable aircraft (APV with SBAS). There was no previous assignment for this letter.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **E1, E2 and E3** **E1**: ACARS FMC WPR **E2**: ACARS D-FIS **E3**: ACARS PDC	Letter E had not been assigned before. A numeric value is inserted next to letter E.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **J1, J2, J3, J4, J5, J6 and J7** **J1**: CPDLC ATN VDL Mode 2 **J2**: CPDLC FANS 1/A HFDL **J3**: CPDLC FANS1/A VDL Mode A **J4**: CPDLC FANS1/A VDL Mode 2 **J5**: CPDLC FANS1/A SATCOM (INMARSAT) **J6**: CPDLC FANS/1/A SATCOM (MTSAT) **J7**: CPDLC FANS 1/A SATCOM (Iridium)	A numerical value is inserted in addition to letter J, and letter J, which originally identified data link, now identifies the various means for CPDLC.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **M1, M2 and M3** **M1**: ATC RTF SATCOM (INMARSAT) **M2**: ATC RTF (MTSAT) **M3**: ATC RTF (Iridium)	Letter M is associated to satellite RTF. A number identifying the satellite system used is inserted next to letter M.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 10 (Part A)* **P1-P9** Reserved for RCP	Letter P links communication performance requirements. A number is inserted next to letter P to identify the various performance requirements.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept numerical values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part A)* **R** Approved PBN	Letter R is associated to the approved PBN, and was previously associated to RNP type certification. When letter R is used, PBN values reached are specified in Item 18 after the PBN/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **W** Approved RVSM	Letter W is assigned to identify RVSM approval.	No effect	N effect	No effect	No effect	No effect	No effect
Item 10 (Part A)* **X** Approved MNPS	Letter X is assigned to identify MNPS.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Y** VHF with 8.33Khz separation capability	Letter Y is assigned to identify the capability of the VHF system to operate with a 8.33 Khz separation.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part A)* **Z** Other equipment installed on board or other capabilities	In addition to other equipment installed on board, the term for other capabilities is also inserted. Other equipment or capabilities must be specified in the flight plan, in Item 18, after a new DAT/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **E Transponder-Mode S**	Letter E indicates: Transponder Mode S, including aircraft identification, pressure altitude, and extended squitter capability (ADS-B).	No effect: The FPL template in the AFTN user terminal accepts the new values. Affects: The FPL template in the AMHS user terminal does not accept the letter E	No effect	Affects: The FPL template in the AMHS user terminal does not accept the letter E	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **H Transponder-Mode S**	Letter H indicates Transponder Mode S, including aircraft identification, pressure altitude, and improved surveillance capability.	No effect: The FPL template in the AFTN user terminal accepts the new values. Affects: The FPL template in the AMHS user terminal does not accept the letter H	No effect	Affects: The FPL template in the AMHS user terminal does not accept the letter H	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **I Transponder-Mode S**	Letter I indicates Transponder Mode S, including aircraft identification, but with no pressure altitude capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **L Transponder Mode S**	Letter L in the new format indicates Transponder Mode S, pressure altitude, extended squitter (ADS-B) and enhanced surveillance capabilities	No effect: The FPL template in the AFTN user terminal accepts the new values. Affects: The FPL template in the AMHS user terminal does not accept the letter L	No effect	Affects: The FPL template in the AMHS user terminal does not accept the letter L	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **X Transponder Mode S**	Letter X in the new format indicates Transponder Mode S, with no aircraft identification or pressure altitude capability.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect
Item 10 (Part B)* **ADS-B B1 and B2** **B1**: ADS-B with specialised 1090Mhz ADS-B out capability **B2**: ADS-B with specialised 1090Mhz ADS-B out and ADS-B in capability **U1 and U2** **U1**: ADS-B out capability using UAT **U2**: ADS-B out and in capability using UAT **V1 and V2** **V1**: ADS-B out capability using VDL-4 **V2**: ADS B out and in capability using VDL-4	Letters B, U, and V indicate new capabilities for ADS-B depending whether the equipment broadcasts in 1090Mhz, UAT, or VDL 4. Numbers are inserted next to the letters to identify ADS-B out and ADS-B out and in capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 10 (Part B)* **ADS-C D1 and G1** **D1**: ADS-C with FANS1/A capabilities **G1**: ADS–C with ATN capabilities	D and G are new letters to which a numeric value is added, and indicate ADS-C with FANS1/A capabilities and ADS-C with ATN capabilities.	No effect: The AFTN FPL template accepts new values. Affects: the AMHS FPL template does not accept new values	No effect: The information in Item 10 is filled in flight plan format Item Q for the repetitive flight plan systems (Appendix 2, Section 6, Chapter 16, Doc 4444), and is accepted	Affects: The FDP does not accept numbers in Item 10	No effect: This system does not use the information contained in Item 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Item 10 and, consequently, is not sending information to the printer.	No effect: This system does not use the information contained in Item 10 in radar data processing	No effect: Flight plan display is not dependent upon the content of Item 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Item 18 SUR/ indicator	Additional surveillance applications should be listed in Item 18 after the SUR/ indicator.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 **STS/ indicator** **ALTRV** **ATFMX** **FFR** **FLTCK**	The reason for special management by ATS, for instance search and rescue mission, as follows: **ALTRV**: for a flight conducted according to an altitude reservation **ATFMX**: for a flight whose exemption from ATFM measures has been approved by the appropriate ATS authorities **FFR**: Fire fighting **FLTCK**: flight check for calibration of navigation aid.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 **(**Cont.) **STS/ indicator** **HAZMAT** **HEAD** **HOSP**	**HAZMAT**: for a flight carrying hazardous material **HEAD**: a flight with Head of State status **HOSP**: for a medical flight declared by the medical authorities.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **STS/ indicator HUM MARSA MEDEVAC NONRVSM**	**HUM**: for a flight conducting a humanitarian mission. **MARSA**: for a flight for which a military entity assumes the responsibility for its separation from military aircraft **MEDEVAC**: for a medical emergency evacuation that is critical to save lives. **NONRVSM**: For a flight that has no RVSM capability and intends to operate in RVSM airspace.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	
Item 18 (Cont.) **STS/ indicator SAR STATE**	**SAR**: for a flight conducting a search and rescue mission **STATE**: for a flight performing military customs or police services.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 PBN/ indicator RNAV specification **A1**: RNAV10 (RNP10) **B1**: RNAV5 All of the allowed sensors **B2**: RNAV5 GNSS **B3**: RNAV5 DME/DME **B4**: RNAV5 VOR/DME **B5**: RNAV5 INS or IRS **B6**: RNAV5 LORAN C	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNAV specification** **C1:** RNAV2 with all sensors **C2:** RNAV2 with GNSS **C3:** RNAV2 DME/DME **C4:** RNAV2 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNAV specification** **D1:** RNAV 1 with all sensors **D2:** RNAV1 GNSS **D3:** RNAV1 DME/DME **D4:** RNAV1 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 (Cont.) **PBN/ indicator RNP specification** **L1**: RNP-4 **O1**: Basic RNP with all allowed sensors **O2**: Basic RNPGNSS **O3**: Basic RNP 1 DME DME **O4**: Basic RNP1 DME/DME /IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNP specification** **S1:** RNP APPCH **S2:** RNP APPCH with Baro VNAV	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 (Cont.) **PBN/ indicator RNP specification** **T1**: RNP AR APPCH with RF **T2**: RNP AR APPCH without RF	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 DLE/ indicator	**DLE** New indicator related to en-route delay or holding. En-route significant points where delay is expected to occur are to be inserted, followed by the duration of the delay, using four digits for time, in hours and minutes.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 ORGN/ indicator	The 8-letter AFTN address of the originator and other details of the appropriate contact, when the flight plan originator cannot be easily identified as stipulated by the appropriate authority.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Item 18 TALT/ indicator	Four-letter ICAO indicators for alternate take-off aerodromes as specified in Location Indicators, Doc 7910 or the name of the alternate en-route aerodromes if no indicator is assigned. For aerodromes not listed in the relevant aeronautical information publication, indicate the location in LAT/LONG or bearing and distance with respect to the closest significant point as described in DEP/.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect
Item 18 DOF/ indicator	Date of departure of the flight in a six-digit format (YYMMDD), where AA is the year, MM the month, and DD is the day.	No effect	No effect	No effect	No effect	No effect: This system does not use the information contained in Item 18 in radar data processing	No effect

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* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

APPENDIX E

MODEL ACTION PLAN FOR THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE FIFTEENTH EDITION OF ICAO DOCUMENT 4444)

Instructions for the development of the action plan

The attached document shows a model action plan for the implementation of the new flight plan format so that all SAM States may use the same format.

The model action plan contains eight sections. The content of the first four sections (objectives, scope, background and reference documentation for the implementation of the action plan) and of the eighth section (attachments) is suggested as standard material to be included in all action plans of the States.

In order to develop the action plan, the States should complete the content of Section 5 - *Identification of activities to be carried out before the implementation of the new flight plan format*, Section 6 - *Activities for the implementation of the new flight plan format* and Section 7 - *Timetable for the execution of the activities for the implementation of the new flight plan format* following the instructions shown in the model.

MODEL ACTION PLAN FOR THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT

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Attachment A ICAO State Letter AN/13/2.1-08/50 of 25 June 2008 (Amendment 1 to the Procedures for Air Navigation Services — Air traffic management, 15th Edition (PANS-ATM, Doc 4444) A-1

Attachment B ICAO State Letter AN/13/2.1-09/9 of 6 February 2009 (Guidance for the implementation of flight plan information to support Amendment 1 to the Procedures for Air Navigation Services — Air traffic management, 15th Edition (PANS-ATM, Doc 4444) B-1

Attachment C Strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Document 4444) in the CAR/SAM Regions C-1

Attachment D Action plan for the implementation of the new flight plan format in the SAM Region - Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Document 4444) D-1

Attachment E Tests to assess the impact of the implementation of the new flight plan format on the equipment identified E-1

1. Objective

1.1 To present the plan for the implementation of the new flight plan format specified in Amendment 1 to the Fifteenth Edition of ICAO Document 4444, following ICAO guidance contained in State Letter AN 13/2.1-09/9 of 6 February 2009, as well as the CAR/SAM implementation strategy and the action plan for the implemetnation of the new flight plan format of the SAM Region.

2. Scope

2.1 This document contains the action plans for the implementation of the new flight plan format during the time period comprised between 2010 and 15 November 2012.

3. Background

3.1 Amendment 1 to the 15th Edition of the PANS-ATM – Doc 4444 was published on 25 June 2008 in ICAO State Letter AN13/2.1-08/50. The amendment seeks mainly to update the ICAO flight plan format to meet the needs of aircraft with advanced capabilities and the requirements of automated air traffic management (ATM) systems.

3.2 Although Amendment 1 has been published, all the information contained in Document 4444 concerning the flight plan format remains unchanged until the implementation of the new format on 15 November 2012.

3.3 The implementation of the new format warrants a change in the systems involved in the flight plan process, as well as a transition period in which both the new and current flight plans will operate until the new flight plan will be the only one operating.

3.4 Both airspace users and air navigation service providers are involved in this process. The implementation of the new flight plan format is a joint task of users and air navigation service providers at national, regional and inter-regional level.

3.5 In order to support the States in the transition to the new flight plan format, ICAO has developed guidance for the implementation of flight plan information, in keeping with Amendment 1 to the 15th Edition of the PANS-ATM – Doc 4444. This guidance is contained in ICAO State letter AN 13/2.1-09/9 of 6 February 2009.

3.6 This guidance was developed in order to make it easier for airspace users and air navigation service providers to use concurrently the current and the new information of flight data processing systems during the transition period.

3.7 At national level, in relation to the implementation of the amendment, the GREPECAS/15 meeting formulated Conclusion 15/35 - *Implementation of the new ICAO flight plan model*, with a view to the development of a regional strategy for the transition to the new flight plan model in the CAR/SAM Regions.

3.8 The CNS/ATM/SG/1 meeting, held in Lima, Peru, on 15-19 March 2010, adopted the *Strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Doc 4444) in the CAR/SAM Regions* through Conclusion CNS/ATM/1-8, which was approved by the States/Territories/International Organisations through the GREPECAS fast-track procedure.

4. Reference documentation for the development of the action plan

4.1 The following documentation has been used as reference for the formulation of the action plan:

4.1.1 ICAO State letter AN/13/2.1-08/50 of 25 June 2008 (Amendment 1 of the Procedures for air navigation services — *Air traffic management*, 15th Edition (PANS-ATM, Doc 4444).

4.1.2 ICAO State letter AN/13/2.1-09/9 of 6 February 2009 (Guidance for implementation of flight plan information to support Amendment 1 of the *Procedures for air navigation services — Air traffic management*, 15th Edition (PANS-ATM, Doc 4444).

4.1.3 Strategy for the implementation of Amendment 1 of the 15th Edition of the ICAO PANS - ATM (Document 4444) in the CAR/SAM Regions.

4.1.4 Action plan for the implementation of the new flight plan format in the SAM Region - Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Document 4444).

5. Identification of the activities to be carried out before the implementation of the new flight plan format

5.1 Identification of the installed equipment that may be affected by the new flight plan format

5.1.1 This section would contain a list of possible equipment installed at the various ATS units at national level that might be affected by the implementation of the new flight plan format**.** For each piece of equipment identified, indicate model, manufacturer, year of installation, place where it is installed, and possible block configuration.

Example:

Equipment	Make - Model	Year of installation	Location
AFTN system	Syseca	1995	AFTN equipment terminals containing the FPL template are installed at all aerodromes, control towers, APP and ACCs at national level.
FDP Processor, terminal equipment, display systems	INDRA Aircom 2000	2001	FDP terminals installed in the ACC, APP, and …. towers
RDP	INDRA Aircom 2000	2001	ACC, …. APP
etc.			

5.2 Tests to assess the impact of the implementation of the new flight plan format on the equipment identified

5.2.1 This section will provide information about the tests to be carried out in order to analyse the impact of the implementation of the new flight plan format on each of the changes foreseen for each possible equipment identified in the flight plan process, using as a possible model the table shown in **Attachment E.**

5.3 Identification of the changes required in the systems involved in the flight plan during the transition period when the NEW and CURRENT flight plan formats are in operation

5.3.1 This section will identify in what systems involved in the flight plans will changes be required during the transition period during which both the CURRENT and the NEW flight plan formats are to be used.

5.4 Identification of the national team that will carry out the implementation of the new flight plan format

5.4.1 This section will include a list of the individuals involved in the implementation of the new flight plan format, identifying the responsibilities assigned to each of them. The designated personnel should come from both the air navigation service provider and the users.

5.5 Identification of the training activities required for the implementation of the new flight plan format

5.5.1 This section will describe the training activities foreseen for the operational and technical personnel of air navigation service providers involved in flight plan management and in the required training of airspace users.

5.6 Development of contingency procedures and technical/operational considerations for the transition

5.6.1 This section will provide information about the contingency procedures to be implemented in case the activities contemplated for the implementation of the new flight plan format are not implemented on time.

6. Activities for the implementation of the new flight plan format

6.1 Process for the implementation of the new flight plan format

6.1.1 This section must contain information about the process that the State will carry out for the implementation of the new flight plan format, as well as the processing capacity during the transition period of the CURRENT and NEW flight plan format, describing whether it will be carried out by staff of the aeronautical administration itself or through a bidding process.

6.2 Operational tests with the NEW and CURRENT flight plan formats

6.2.1 This section should contain information about the national and inter-State tests on the NEW and CURRENT flight plans, with a view to the concurrent operation of the CURRENT and NEW flight plan formats from 1 July 2012 to 15 November 2012.

7. Timetable for the execution of activities for the implementation of the new flight plan format

7.1 This section will describe the estimated dates for the implementation of the activities described in Sections 5 and 6 of the action plan. To this end, it is suggested that the GANTT of Microsoft Project be used. It is important to note that, for a harmonious implementation of the flight plan in all the States of the Region, implementation dates must be aligned with those established in the regional action plan for the SAM Region.

8. Attachments

International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

Tel.: +1 (514) 954-6711

25 June 2008

Ref.: AN 13/2.1-08/50

Subject: Approval of Amendment 1 to the PANS-ATM

Action required: a) Implementation of the amendment on 15 November 2012; b) Publication of any differences as of 15 November 2012

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission, acting under delegated authority, at the first and second meetings of its 177th Session, on 22 and 24 January 2008, approved Amendment 1 to the *Procedures for Air Navigation Services — Air Traffic Management*, Fifteenth Edition (PANS-ATM, Doc 4444) for applicability on 15 November 2012. The amendment was approved on 27 May 2008 by the President of the Council on behalf of the Council in accordance with established procedure.

2. Amendment 1 stems from the work of the Flight Plan Study Group (FPLSG). The nature and scope of the amendment is to update the ICAO model flight plan form in order to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, while taking into account compatibility with existing systems, human factors, training, cost and transition aspects.

3. Copies of the interim edition of the amendment are available as attachments to the electronic version of this State letter on the ICAO-NET (www.icao.int/icaonet). The interim edition contains the text as it was approved by the Council and provided to you pending the issue of the replacement pages for the PANS-ATM in which the amendment will be incorporated. Please note that the attached amendment consists solely of a change to the ICAO model flight plan form, related ATS messages and procedures and has an applicability date of 15 November 2012. As the existing ICAO flight plan will remain in use during the interim period it is deemed premature for ICAO to distribute the blue cover State letter containing the replacement pages associated with the amendment. Therefore, the replacement pages will be distributed in October 2012. In the meantime, you may wish to use the amendment contained in this letter to begin updating your flight data processing systems to meet the new requirements which will be applicable in 2012.

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4. In accordance with the decision of the 26th Session of the Assembly, I would like to bring to your attention the Organization's long-standing practice of providing documentation to States upon request. In this regard, I wish to refer you to the ICAO-NET website (www.icao.int/icaonet) where you can access all relevant documentation. The practice of dispatching printed copies of such documentation has now been discontinued.

5. Your Government is invited by the Council to implement the provisions of PANS-ATM as amended. In this connection, I draw your attention to the decision taken by the Council, on 1 October 1973, to discontinue the publication of differences in Supplements to the PANS documents and, instead, to request States to publish up-to-date lists of significant differences from PANS documents in their Aeronautical Information Publications.

6. May I, therefore, invite your Government to publish in your Aeronautical Information Publication a list of any significant differences which will exist on 15 November 2012 between the amended provisions of PANS-ATM and your national regulations and practices.

Accept, Sir/Madam, the assurances of my highest consideration.

Taïeb Chérif
Secretary General

Enclosure:

Amendment to the Foreword of the PANS-ATM

ATTACHMENT to State letter AN 13/2.1-08/50

AMENDMENT TO THE FOREWORD OF THE PANS-ATM, FIFTEENTH EDITION

Add the following at the end of Table A:

Amendment	***Source(s)***	***Subject***	***Approved Applicable***
1	Flight Plan Study Group (FPLSG)	Update the ICAO model flight plan form.	27 May 2008 15 November 2012

— END —

AMENDMENT NO. 1

TO THE

PROCEDURES
FOR
AIR NAVIGATION SERVICES

AIR TRAFFIC MANAGEMENT

(Doc 4444)

INTERIM EDITION

The text of Amendment No. 1 to the PANS-ATM (Doc 4444) was approved by the President of the Council of ICAO on behalf of the Council on **27 May 2008** for applicability on **15 November 2012**. This interim edition is distributed to facilitate implementation of the amendment by States. Replacement pages incorporating Amendment No. 1 are expected to be distributed in October 2012. (State letter AN 13/2.1-08/50 refers.)

MAY 2008

INTERNATIONAL CIVIL AVIATION ORGANIZATION

PROPOSED AMENDMENT TO THE *PROCEDURES FOR AIR NAVIGATION SERVICES — AIR TRAFFIC MANAGEMENT (PANS-ATM, DOC 4444)*

NOTES ON THE PRESENTATION OF THE PROPOSED AMENDMENT

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

1.	~~Text to be deleted is shown with a line through it~~	text to be deleted
2.	New text to be inserted is highlighted with grey shading	new text to be inserted
3.	~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading.	new text to replace existing text

PROCEDURES FOR AIR NAVIGATION SERVICES — AIR TRAFFIC MANAGEMENT (PANS-ATM, DOC 4444)

. . .

CHAPTER 4. GENERAL PROVISIONS FOR AIR TRAFFIC SERVICES

. . .

4.4 FLIGHT PLAN

4.4.1 Flight plan form

Note.— Procedures for the use of repetitive flight plans are contained in Chapter 16, Section 16.4.

. . .

4.4.1.3 Operators and air traffic services units should comply with:

a) the instructions for completion of the flight plan form and the repetitive flight plan listing form given in Appendix 2; and

b) any constraints identified in relevant Aeronautical Information Publications (AIPs).

Note 1.— Failure to adhere to the provisions of Appendix 2 or any constraint identified in relevant AIPs may result in data being rejected, processed incorrectly or lost.

Note 2.— The instructions for completing the flight plan form given in Appendix 2 may be conveniently printed on the inside cover of flight plan form pads, or posted in briefing rooms.

. . .

4.4.2 Submission of a flight plan

4.4.2.1 PRIOR TO DEPARTURE

4.4.2.1.1 Flight plans shall not be submitted more than 120 hours before the estimated off-block time of a flight.

4.4.2.1.~~1~~2 Except when other arrangements have been made for submission of repetitive flight plans, a flight plan submitted prior to departure should be submitted to the air traffic services reporting office at the departure aerodrome. If no such unit exists at the departure aerodrome, the flight plan should be submitted to the unit serving or designated to serve the departure aerodrome.

4.4.2.1.~~2~~3 In the event of a delay of 30 minutes in excess of the estimated off-block time for a controlled flight or a delay of one hour for an uncontrolled flight for which a flight plan has been submitted, the flight plan should be amended or a new flight plan submitted and the old flight plan cancelled, whichever is applicable.

CHAPTER 11. AIR TRAFFIC SERVICES MESSAGES

. . .

11.4 MESSAGE TYPES AND THEIR APPLICATION

. . .

11.4.2 Movement and control messages

. . .

11.4.2.2 MOVEMENT MESSAGES

. . .

11.4.2.2.2 FILED FLIGHT PLAN (FPL) MESSAGES

Note.— Instructions for the transmission of an FPL message are contained in Appendix 2.

. . .

11.4.2.2.2.5 FPL messages ~~shall normally~~should be transmitted immediately after the filing of the flight plan. ~~However, i~~If a flight plan is filed more than 24 hours in advance of the estimated off-block time of the flight to which it refers, ~~that flight plan shall be held in abeyance until at most 24 hours before the flight begins so as to avoid the need for the insertion of a date group into that~~ the date of the flight departure shall be inserted in Item 18 of the flight plan. ~~In addition, if a flight plan is filed early and the provisions of 11.4.2.2.2.2 b) or e) or 11.4.2.2.2.3 apply, transmission of the FPL message may be withheld until one hour before the estimated off-block time, provided that this will permit each air traffic services unit concerned to receive the information at least 30 minutes before the time at which the aircraft is estimated to enter its area of responsibility.~~

. . .

11.4.2.2.4 MODIFICATION (CHG) MESSAGES

A CHG message shall be transmitted when any change is to be made to basic flight plan data contained in previously transmitted FPL or RPL data. The CHG message shall be sent to those recipients of basic flight plan data which are affected by the change. Relevant revised basic flight plan data shall be provided to such affected entities not previously having received this.

Note.— See 11.4.2.3.4 concerning notification of a change to coordination data contained in a previously transmitted current flight plan or estimate message.

. . .

APPENDIX 2. FLIGHT PLAN

. . .

2. Instructions for the completion of the flight plan form

. . .

2.2 Instructions for insertion of ATS data

Complete Items 7 to 18 as indicated hereunder.

Complete also Item 19 as indicated hereunder, when so required by the appropriate ATS authority or when otherwise deemed necessary.

Note 1.— Item numbers on the form are not consecutive, as they correspond to Field Type numbers in ATS messages.

Note 2.— Air traffic services data systems may impose communications or processing constraints on information in filed flight plans. Possible constraints may, for example, be limits with regard to item length, number of elements in the route item or total flight plan length. Significant constraints are documented in the relevant Aeronautical Information Publication.

ITEM 7: AIRCRAFT IDENTIFICATION (MAXIMUM 7 CHARACTERS)

INSERT one of the following aircraft identifications, not exceeding 7 alphanumeric characters and without hyphens or symbols:

~~a~~b) the nationality or common mark and registration mark~~ing~~ of the aircraft (e.g. EIAKO, 4XBCD, N2567GA), when:

1) in radiotelephony the call sign to be used by the aircraft will consist of this identification alone (e.g. ~~OOTEK~~CGAJS), or preceded by the ICAO telephony designator for the aircraft operating agency (e.g. ~~SABENA OOTEK~~BLIZZARD CGAJS);

2) the aircraft is not equipped with radio~~;~~.

OR ~~b~~a) the ICAO designator for the aircraft operating agency followed by the flight identification (e.g. KLM511, NGA213, JTR25) when in radiotelephony the call sign to be used by the aircraft will consist of the ICAO telephony designator for the operating agency followed by the flight identification (e.g. KLM511, NIGERIA 213, ~~HERBIE~~JESTER 25)~~.~~;

Note 1.— Standards for nationality, common and registration marks to be used are contained in Annex 7, Chapter 2.

Note 2.— Provisions for the use of radiotelephony call signs are contained in Annex 10, Volume II, Chapter 5. ICAO designators and telephony designators for aircraft operating agencies are contained in Doc 8585 — Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services.

ITEM 8: FLIGHT RULES AND TYPE OF FLIGHT (ONE OR TWO CHARACTERS)

Flight rules

INSERT one of the following letters to denote the category of flight rules with which the pilot intends to comply:

I if it is intended that the entire flight will be operated under the IFR
V if it is intended that the entire flight will be operated under the VFR
Y if the flight initially will be operated under the IFR ~~first) and specify in Item 15 the point~~, followed by one or more subsequent changes of flight rules or
Z if the flight initially will be operated under the VFR ~~first)~~, followed by one or more subsequent changes of flight rules

Specify in Item 15 the point or points at which a change of flight rules is planned.

Type of flight

INSERT one of the following letters to denote the type of flight when so required by the appropriate ATS authority:

S if scheduled air service
N if non-scheduled air transport operation
G if general aviation
M if military
X if other than any of the defined categories above.

Specify status of a flight following the indicator STS in Item 18, or when necessary to denote other reasons for specific handling by ATS, indicate the reason following the indicator RMK in Item 18.

. . .

ITEM 10: EQUIPMENT AND CAPABILITIES

Capabilities comprise the following elements:

a) presence of relevant serviceable equipment on board the aircraft;

b) equipment and capabilities commensurate with flight crew qualifications; and

c) where applicable, authorization from the appropriate authority.

Radio communication, navigation and approach aid equipment and capabilities

INSERT one letter as follows:

N if no COM/NAV/approach aid equipment for the route to be flown is carried, or the equipment is unserviceable,

OR S if standard COM/NAV/approach aid equipment for the route to be flown is carried and serviceable (see Note 1),

AND/OR

INSERT one or more of the following letters to indicate the serviceable COM/NAV/approach aid equipment and capabilities available ~~and serviceable~~:

A	~~(Not allocated)~~GBAS landing system	J7	CPDLC FANS 1/A SATCOM (Iridium)
B	~~(Not allocated)~~LPV (APV with SBAS)	K	~~(~~MLS~~)~~
C	LORAN C	L	ILS
D	DME	M1	~~Omega~~ATC RTF SATCOM (INMARSAT)
E1	~~(Not allocated)~~FMC WPR ACARS	M2	ATC RTF (MTSAT)
E2	D-FIS ACARS	M3	ATC RTF (Iridium)
E3	PDC ACARS	O	VOR
F	ADF	~~P~~P1–P9	~~(Not allocated)~~Reserved for RCP
G	~~(~~GNSS~~)~~ (*See Note 2*)	~~Q~~	~~(Not allocated)~~
H	HF RTF	R	~~RNP type certification~~PBN approved *(see Note ~~5~~4)*
I	Inertial Navigation	T	TACAN
J1	~~(Data Link)~~CPDLC ATN VDL Mode 2(*See Note 3*)	U	UHF RTF
J2	CPDLC FANS 1/A HFDL	V	VHF RTF
J3	CPDLC FANS 1/A VDL Mode A	W	RVSM approved
J4	CPDLC FANS 1/A VDL Mode 2	X	MNPS approved
J5	CPDLC FANS 1/A SATCOM (INMARSAT)	Y	~~when prescribed by ATS~~VHF with 8.33 kHz channel spacing capability
J6	CPDLC FANS 1/A SATCOM (MTSAT)	Z	Other equipment carried or other capabilities *(see Note ~~2~~5)*

Any alphanumeric characters not indicated above are reserved.

Note 1.— If the letter S is used, sStandard equipment is considered to be VHF RTF, ~~ADF,~~ VOR and ILS, unless another combination is prescribed by the appropriate ATS authority.

Note 2.— If the letter G is used, the types of external GNSS augmentation, if any, are specified in Item 18 following the indicator NAV/ and separated by a space.

Note ~~2~~5.— If the letter Z is used, specify in Item 18 the other equipment carried or other capabilities, preceded by COM/ ~~and/or~~, NAV/ and/or DAT, as appropriate.

Note 3.— ~~If the letter J is used, specify in Item 18 the equipment carried, preceded by DAT/ followed by one or more letters as appropriate.~~See RTCA/EUROCAE Interoperability Requirements Standard For ATN Baseline 1 (ATN B1 INTEROP Standard – DO-280B/ED-110B) for data link services air traffic control clearance and information/air traffic control communications management/air traffic control microphone check.

Note ~~4~~6.— Information on navigation capability is provided to ATC for clearance and routing purposes.

Note ~~5~~4.— ~~Inclusion of~~If the letter R is used, the performance based navigation levels that can be met are specified in Item 18 following the indicator PBN/. Guidance material on the application of performance based navigation to a specific ~~indicates that an aircraft meets the RNP type prescribed for the~~ route segment~~(s)~~, route~~(s) and/~~or area ~~concerned~~ is contained in the Performance-Based Navigation Manual *(Doc 9613).*

Surveillance equipment and capabilities

INSERT N if no surveillance equipment for the route to be flown is carried, or the equipment is unserviceable,

OR

INSERT one or ~~two~~more of the following ~~letters~~descriptors, to a maximum of 20 characters, to describe the serviceable surveillance equipment ~~carried~~and/or capabilities on board:

~~*SSR equipment*~~*SSR Modes A and C*

~~N Nil~~
A Transponder — Mode A (4 digits — 4 096 codes)
C Transponder — Mode A (4 digits — 4 096 codes) and Mode C

SSR Mode S

~~X Transponder — Mode S without both aircraft identification and pressure-altitude transmission~~
E Transponder — Mode S, including aircraft identification, pressure-altitude and extended squitter (ADS-B) capability
H Transponder — Mode S, including aircraft identification, pressure-altitude and enhanced surveillance capability
I Transponder — Mode S, including aircraft identification, but no pressure-altitude capability
L Transponder — Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability
P Transponder — Mode S, including pressure-altitude, but no aircraft identification

~~transmission~~capability

~~I Transponder — Mode S, including aircraft identification transmission, but no pressure-altitude transmission~~

S Transponder — Mode S, including both pressure altitude and aircraft identification ~~transmission~~capability

X Transponder — Mode S with neither aircraft identification nor pressure-altitude capability

Note.— Enhanced surveillance capability is the ability of the aircraft to down-link aircraft derived data via a Mode S transponder.

ADS-B

B1 ADS-B with dedicated 1090 MHz ADS-B "out" capability
B2 ADB-B with dedicated 1090 MHz ADS-B "out" and "in" capability
U1 ADS-B "out" capability using UAT
U2 ADS-B "out" and "in" capability using UAT
V1 ADS-B "out" capability using VDL Mode 4
V2 ADS-B "out" and "in" capability using VDL Mode 4

ADS-C

D1 ADS-C with FANS 1/A capabilities
G1 ADS-C with ATN capabilities

~~*ADS equipment*~~

~~D ADS capability~~

Alphanumeric characters not indicated above are reserved.

Example: ADE3RV/HB2U2V2G1

Note.— Additional surveillance application should be listed in Item 18 following the indicator SUR/ .

ITEM 13: DEPARTURE AERODROME AND TIME (8 CHARACTERS)

INSERT the ICAO four-letter location indicator of the departure aerodrome as specified in Doc 7910, *Location Indicators*,

OR, if no location indicator has been assigned,

INSERT ZZZZ and *SPECIFY*, in Item 18, the name and location of the aerodrome preceded by DEP/ ,

OR, the first point of the route or the marker radio beacon preceded by DEP/…, if the aircraft has not taken off from the aerodrome,

OR, if the flight plan is received from an aircraft in flight,

INSERT AFIL, and *SPECIFY*, in Item 18, the ICAO four-letter location indicator of the location of the ATS unit from which supplementary flight plan data can be obtained, preceded by DEP/ .

THEN, WITHOUT A SPACE,

INSERT for a flight plan submitted before departure, the estimated off-block time (EOBT),

OR, for a flight plan received from an aircraft in flight, the actual or estimated time over the first point of the route to which the flight plan applies.

ITEM 15: ROUTE

INSERT the *first cruising speed* as in (a) and the *first cruising level* as in (b), without a space between them.

THEN, following the arrow, *INSERT* the route description as in (c).

(a) Cruising speed (maximum 5 characters)

INSERT the *True Air Speed* for the first or the whole cruising portion of the flight, in terms of:

Kilometres per hour, expressed as K followed by 4 figures (e.g. K0830), *or*

Knots, expressed as N followed by 4 figures (e.g. N0485), *or*

True Mach number, when so prescribed by the appropriate ATS authority, to the nearest hundredth of unit Mach, expressed as M followed by 3 figures (e.g. M082).

(b) Cruising level (maximum 5 characters)

INSERT the planned cruising level for the first or the whole portion of the route to be flown, in terms of:

Flight level, expressed as F followed by 3 figures (e.g. F085; F330), *or*

**Standard Metric Level in tens of metres,* expressed as S followed by 4 figures (e.g. S1130), *or*

Altitude in hundreds of feet, expressed as A followed by 3 figures (e.g. A045; A100), *or*

Altitude in tens of metres, expressed as M followed by 4 figures (e.g. M0840), *or*

for uncontrolled VFR flights, the letters VFR.

*When so prescribed by the appropriate ATS authorities.

(c) Route (including changes of speed, level and/or flight rules)

Flights along designated ATS routes

INSERT, if the departure aerodrome is located on or connected to the ATS route, the designator of the first ATS route,

OR, if the departure aerodrome is not on or connected to the ATS route, the letters DCT followed by the point of joining the first ATS route, followed by the designator of the ATS route.

THEN

INSERT each point at which either a change of speed and/or level is planned to commence, or a change of ATS route, and/or a change of flight rules is planned,

Note.— When a transition is planned between a lower and upper ATS route and the routes are oriented in the same direction, the point of transition need not be inserted.

FOLLOWED IN EACH CASE

by the designator of the next ATS route segment, even if the same as the previous one,

OR by DCT, if the flight to the next point will be outside a designated route, unless both points are defined by geographical coordinates.

Flights outside designated ATS routes

INSERT points normally not more than 30 minutes flying time or 370 km (200 NM) apart, including each point at which a change of speed or level, a change of track, or a change of flight rules is planned.

OR, when required by appropriate ATS authority(ies),

DEFINE the track of flights operating predominantly in an east-west direction between 70°N and 70°S by reference to significant points formed by the intersections of half or whole degrees of latitude with meridians spaced at intervals of 10 degrees of longitude. For flights operating in areas outside those latitudes the tracks shall be defined by significant points formed by the intersection of parallels of latitude with meridians normally spaced at 20 degrees of longitude. The distance between significant points shall, as far as possible, not exceed one hour's flight time. Additional significant points shall be established as deemed necessary.

For flights operating predominantly in a north-south direction, define tracks by reference to significant points formed by the intersection of whole degrees of longitude with specified parallels of latitude which are spaced at 5 degrees.

INSERT DCT between successive points unless both points are defined by geographical coordinates or by bearing and distance.

USE ONLY the conventions in (1) to (5) below and *SEPARATE* each sub-item by a space.

(1) | ATS route (2 to 7 characters) |

The coded designator assigned to the route or route segment including, where appropriate, the coded designator assigned to the standard departure or arrival route (e.g. BCN1, Bl, R14, UB10, KODAP2A).

Note.— Provisions for the application of route designators are contained in Annex 11, Appendix 1, ~~whilst guidance material on the application of an RNP type to a specific route segment(s), route(s) or area is contained in the~~ Manual on Required Navigation Performance (RNP) *~~(Doc 9613)~~*.

(2) Significant point (2 to 11 characters)

The coded designator (2 to 5 characters) assigned to the point (e.g. LN, MAY, HADDY), *or,* if no coded designator has been assigned, one of the following ways:

— *Degrees only* (7 characters):

2 figures describing latitude in degrees, followed by "N" (North) or "S" (South), followed by 3 figures describing longitude in degrees, followed by "E" (East) or "W" (West). Make up the correct number of figures, where necessary, by insertion of zeros, e.g. 46N078W.

— *Degrees and minutes* (11 characters):

4 figures describing latitude in degrees and tens and units of minutes followed by "N" (North) or "S" (South), followed by 5 figures describing longitude in degrees and tens and units of minutes, followed by "E" (East) or "W" (West). Make up the correct number of figures, where necessary, by insertion of zeros, e.g. 4620N07805W.

— *Bearing and distance from a ~~navigation aid~~significant point:*

The identification of the ~~navigation aid (normally a VOR)~~significant point, ~~in the form of 2 or 3 characters, THEN~~followed by the bearing from the ~~aid~~point in the form of 3 figures giving degrees magnetic, ~~THEN~~followed by the distance from the ~~aid~~point in the form of 3 figures expressing nautical miles. In areas of high latitude where it is determined by the appropriate authority that reference to degrees magnetic is impractical, degrees true may be used. Make up the correct number of figures, where necessary, by insertion of zeros — e.g. a point 180° magnetic at a distance of 40 nautical miles from VOR "DUB" should be expressed as DUB180040.

(3) Change of speed or level (maximum 21 characters)

The point at which a change of speed (5% TAS or 0.01 Mach or more) or a change of level is planned to commence, expressed exactly as in (2) above, followed by an *oblique stroke and both the cruising speed and the cruising level*, expressed exactly as in (a) and (b) above, without a space between them, *even when only one of these quantities will be changed.*

Examples: LN/N0284A045
MAY/N0305Fl80
HADDY/N0420F330
4602N07805W/N0500F350
46N078W/M082F330
DUB180040/N0350M0840

(4) Change of flight rules (maximum 3 characters)

The point at which the change of flight rules is planned, expressed exactly as in (2) or (3) above as appropriate, *followed by a space and one of the following*:

VFR if from IFR to VFR
IFR if from VFR to IFR

Examples: LN VFR
LN/N0284A050 IFR

(5) Cruise climb (maximum 28 characters)

The letter C followed by an *oblique stroke*; *THEN the point at which cruise climb is planned to start*, expressed exactly as in (2) above, *followed by an oblique stroke; THEN the speed to be maintained during cruise climb*, expressed exactly as in (a) above, followed by *the two levels defining the layer to be occupied during cruise climb*, each level expressed exactly as in (b) above, *or the level above which cruise climb is planned followed by the letters PLUS*, without a space between them.

Examples: C/48N050W/M082F290F350
C/48N050W/M082F290PLUS
C/52N050W/M220F580F620.

ITEM 16: DESTINATION AERODROME AND TOTAL ESTIMATED ELAPSED TIME, DESTINATION ALTERNATE AERODROME(S)

Destination aerodrome and total estimated elapsed time (8 characters)

INSERT the ICAO four-letter location indicator of the destination aerodrome ~~followed, without a space, by the total estimated elapsed time~~as specified in Doc 7910, *Location Indicators*,

OR , if no location indicator has been assigned,

INSERT *ZZZZ* ~~followed, without a space, by the total estimated elapsed time, and~~ *SPECIFY* in Item 18 the name and location of the aerodrome, preceded by DEST/ .

THEN WITHOUT A SPACE

INSERT the total estimated elapsed time.

Note.— For a flight plan received from an aircraft in flight, the total estimated elapsed time is the estimated time from the first point of the route to which the flight plan applies to the termination point of the flight plan.

Destination a~~A~~lternate aerodrome(s) ~~(4 characters)~~

INSERT the ICAO four-letter location indicator(s) of not more than two destination alternate aerodromes, as specified in Doc 7910, *Location Indicators*, separated by a space,

OR, if no location indicator has been assigned to the destination alternate aerodrome(s),

INSERT ZZZZ and *SPECIFY* in Item 18 the name and location of the destination alternate aerodrome(s), preceded by ALTN/ .

ITEM 18: OTHER INFORMATION

Note.— Use of indicators not included under this item may result in data being rejected, processed incorrectly or lost.

Hyphens or oblique strokes should only be used as prescribed below.

INSERT 0 (zero) if no other information,

OR, any other necessary information in the ~~preferred~~ sequence shown hereunder, in the form of the appropriate indicator selected from those defined hereunder followed by an oblique stroke and the information to be recorded:

STS/ Reason for special handling by ATS, e.g. a search and rescue mission, as follows:

ALTRV: for a flight operated in accordance with an altitude reservation;
ATFMX: for a flight approved for exemption from ATFM measures by the appropriate ATS authority;
FFR: fire-fighting;
FLTCK: flight check for calibration of navaids;
HAZMAT: for a flight carrying hazardous material;
HEAD: a flight with Head of State status;
HOSP: for a medical flight declared by medical authorities;
HUM: for a flight operating on a humanitarian mission;
MARSA: for a flight for which a military entity assumes responsibility for separation of military aircraft;
MEDEVAC: for a life critical medical emergency evacuation;
NONRVSM: for a non-RVSM capable flight intending to operate in RVSM airspace;
SAR: for a flight engaged in a search and rescue mission; and
STATE: for a flight engaged in military, customs or police services.

Other reasons for special handling by ATS shall be denoted under the designator RMK/.

PBN/ Indication of RNAV and/or RNP capabilities. Include as many of the descriptors below, as apply to the flight, up to a maximum of 8 entries, i.e. a total of not more than 16 characters.

	RNAV SPECIFICATIONS
A1	RNAV 10 (RNP 10)
B1	RNAV 5 all permitted sensors
B2	RNAV 5 GNSS
B3	RNAV 5 DME/DME
B4	RNAV 5 VOR/DME
B5	RNAV 5 INS or IRS
B6	RNAV 5 LORANC
C1	RNAV 2 all permitted sensors
C2	RNAV 2 GNSS

C3	RNAV 2 DME/DME
C4	RNAV 2 DME/DME/IRU
D1	RNAV 1 all permitted sensors
D2	RNAV 1 GNSS
D3	RNAV 1 DME/DME
D4	RNAV 1 DME/DME/IRU
	RNP SPECIFICATIONS
L1	RNP 4
O1	Basic RNP 1 all permitted sensors
O2	Basic RNP 1 GNSS
O3	Basic RNP 1 DME/DME
O4	Basic RNP 1 DME/DME/IRU
S1	RNP APCH
S2	RNP APCH with BARO-VNAV
T1	RNP AR APCH with RF (special authorization required)
T2	RNP AR APCH without RF (special authorization required)

Combinations of alphanumeric characters not indicated above are reserved.

~~EET/ Significant points or FIR boundary designators and accumulated estimated elapsed times to such points or FIR boundaries, when so prescribed on the basis of regional air navigation agreements, or by the appropriate ATS authority.~~

~~Examples: EET/CAP0745 XYZ0830~~
~~EET/EINN0204~~

~~RIF/ The route details to the revised destination aerodrome, followed by the ICAO four-letter location indicator of the aerodrome. The revised route is subject to reclearance in flight.~~

~~Examples: RIF/DTA HEC KLAX~~
~~Examples: RIF/ESP G94 CLA YPPH~~
~~Examples: RIF/LEMD~~

~~REG/ The registration markings of the aircraft, if different from the aircraft identification in Item 7.~~

~~SEL/ SELCAL Code, if so prescribed by the appropriate ATS authority.~~

~~OPR/ Name of the operator, if not obvious from the aircraft identification in Item 7.~~

~~STS/ Reason for special handling by ATS, e.g. hospital aircraft, one engine inoperative, e.g. STS/HOSP, STS/ONE ENG INOP.~~

~~TYP/ Type(s) of aircraft, preceded if necessary by number(s) of aircraft, if ZZZZ is inserted in Item 9.~~

~~PER/ Aircraft performance data, if so prescribed by the appropriate ATS authority.~~

~~COM/ Significant data related to communication equipment as required by the appropriate ATS authority, e.g. COM/UHF only.~~

~~DAT/ Significant data related to data link capability, using one or more of the letters S, H, V and M, e.g. DAT/S for satellite data link, DAT/H for HF data link, DAT/V for VHF data link, DAT/M for SSR Mode S data link.~~

NAV/ Significant data related to navigation equipment, other than specified in PBN/, as required by the appropriate ATS authority. Indicate GNSS augmentation under this indicator, with a space between two or more methods of augmentation, e.g. NAV/GBAS SBAS.

COM/ Indicate communications applications or capabilities not specified in Item 10a.

DAT/ Indicate data applications or capabilities not specified in 10a.

SUR/ Include surveillance applications or capabilities not specified in Item 10b.

DEP/ Name and location of departure aerodrome, if ZZZZ is inserted in Item 13, or the ~~ICAO four-letter location indicator of the location of the~~ ATS unit from which supplementary flight plan data can be obtained, if AFIL is inserted in Item 13. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location as follows:

With 4 figures describing latitude in degrees and tens and units of minutes followed by "N" (North) or "S" (South), followed by 5 figures describing longitude in degrees and tens and units of minutes, followed by "E" (East) or "W" (West). Make up the correct number of figures, where necessary, by insertion of zeros, e.g. 4620N07805W (11 characters).

OR, Bearing and distance from the nearest significant point, as follows:

The identification of the significant point followed by the bearing from the point in the form of 3 figures giving degrees magnetic, followed by the distance from the point in the form of 3 figures expressing nautical miles. In areas of high latitude where it is determined by the appropriate authority that reference to degrees magnetic is impractical, degrees true may be used. Make up the correct number of figures, where necessary, by insertion of zeros, e.g. a point of 180° magnetic at a distance of 40 nautical miles from VOR "DUB" should be expressed as DUB180040.

OR, The first point of the route (name or LAT/LONG) or the marker radio beacon, if the aircraft has not taken off from an aerodrome.

DEST/ Name and location of destination aerodrome, if ZZZZ is inserted in Item 16. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described under DEP/ above.

DOF/ The date of flight departure in a six figure format (YYMMDD, where YY equals the year, MM equals the month and DD equals the day).

REG/ The nationality or common mark and registration mark of the aircraft, if different from the aircraft identification in Item 7.

EET/ Significant points or FIR boundary designators and accumulated estimated elapsed times from take-off to such points or FIR boundaries, when so prescribed on the basis of regional air navigation agreements, or by the appropriate ATS authority.

Examples: EET/CAP0745 XYZ0830
EET/EINN0204

SEL/ SELCAL Code, for aircraft so equipped.

TYP/ Type(s) of aircraft, preceded if necessary without a space by number(s) of aircraft and separated by one space, if ZZZZ is inserted in Item 9.

Example: TYP/2F15 5F5 3B2

~~ALTN/ Name of destination alternate aerodrome(s), if ZZZZ is inserted in Item 16.~~

~~RALT/ Name of en-route alternate aerodrome(s).~~

CODE/ Aircraft address (expressed in the form of an alphanumerical code of six hexadecimal characters) when required by the appropriate ATS authority. Example: "F00001" is the lowest aircraft address contained in the specific block administered by ICAO.

DLE/ Enroute delay or holding, insert the significant point(s) on the route where a delay is planned to occur, followed by the length of delay using four figure time in hours and minutes (hhmm).

Example: DLE/MDG0030

OPR/ ICAO designator or name of the aircraft operating agency, if different from the aircraft identification in item 7.

ORGN/ The originator's 8 letter AFTN address or other appropriate contact details, in cases where the originator of the flight plan may not be readily identified, as required by the appropriate ATS authority.

Note.— In some areas, flight plan reception centres may insert the ORGN/ identifier and originator's AFTN address automatically.

PER/ Aircraft performance data, indicated by a single letter as specified in the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168)*, Volume I — Flight Procedures*, if so prescribed by the appropriate ATS authority.

ALTN/ Name of destination alternate aerodrome(s), if ZZZZ is inserted in Item 16. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/ above.

RALT/ ICAO four letter indicator(s) for en-route alternate(s), as specified in Doc 7910, *Location Indicators*, or name(s) of en-route alternate aerodrome(s), if no indicator is allocated. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/ above.

TALT/ ICAO four letter indicator(s) for take-off alternate, as specified in Doc 7910, *Location Indicators*, or name of take-off alternate aerodrome, if no indicator is allocated. For aerodromes

not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/ above.

RIF/ The route details to the revised destination aerodrome, following by the ICAO four-letter location indicator of the aerodrome. The revised route is subject to reclearance in flight.

Examples: RIF/DTA HEC KLAX
RIF/ESP G94 CLA YPPH

RMK/ Any other plain language remarks when required by the appropriate ATS authority or deemed necessary.

ITEM 19: SUPPLEMENTARY INFORMATION

. . .

4. Instructions for the transmission of a supplementary flight plan (SPL) message

Items to be transmitted

Transmit items as indicated hereunder, unless otherwise prescribed:

a) AFTN Priority Indicator, Addressee Indicators <<≡, Filing Time, Originator Indicator <<≡ and, if necessary, specific identification of addressees and/or originator;

b) commencing with <<≡ (SPL:

all symbols and data in the unshaded areas of boxes 7, 13, 16 and 18, except that the ')' at the end of box 18 is *not* to be transmitted, and then the symbols in the unshaded area of box 19 down to and including the)<<≡ of box 19,

additional alignment functions as necessary to prevent the inclusion of more than 69 characters in any line of Items 18 and 19. The alignment function is to be inserted only in lieu of a space, so as not to break up a group of data,

letter shifts and figure shifts (not pre-printed on the form) as necessary;

c) the AFTN Ending, as described below:

End-of-Text Signal

a) one LETTER SHIFT

b) two CARRIAGE RETURNS, one LINE FEED

Page-feed Sequence

Seven LINE FEEDS

End-of-Message Signal

Four of the letter N.

. . .

7. Instructions for the completion of the repetitive flight plan (RPL) listing form

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7.4 Instructions for insertion of RPL data

. . .

ITEM G: SUPPLEMENTARY DATA AT

INSERT name and appropriate contact details of ~~contact~~entity where information normally provided under Item 19 of the FPL is kept readily available and can be supplied without delay.

. . .

APPENDIX 3. AIR TRAFFIC SERVICES MESSAGES

1. Message contents, formats and data conventions

. . .

1.2 The standard types of field

. . .

The standard fields of data permitted in ATS messages are as shown in the following table. The numbers in column 1 correspond with those in the reference table on page A3-30.

Field type	*Data*
3	Message type, number and reference data
5	Description of emergency
7	Aircraft identification and SSR Mode and Code
8	Flight rules and type of flight
9	Number and type of aircraft and wake turbulence category
10	Equipment and capabilities
13	Departure aerodrome and time
14	Estimate data
15	Route
16	Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)
17	Arrival aerodrome and time
18	Other information
19	Supplementary information
20	Alerting search and rescue information
21	Radio failure information
22	Amendment

. . .

1.6 Data conventions

. . .

1.6.3 *The expression of position or route*

The following alternative data conventions shall be used for the expression of position or route:

a) from 2 to 7 characters, being the coded designator assigned to an ATS route to be flown;

b) from 2 to 5 characters, being the coded designator assigned to an en-route point;

c) 4 numerics describing latitude in degrees and tens and units of minutes, followed by "N" (meaning "North") or "S" (South), followed by 5 numerics describing longitude in degrees and tens and units of minutes, followed by "E" (East) or "W" (West). The correct number of numerics is to be made up, where necessary, by the insertion of zeros, e.g. "4620N07805W";

d) 2 numerics describing latitude in degrees, followed by "N" (North) or "S" (South), followed by 3 numerics describing longitude in degrees, followed by "E" (East) or "W" (West). Again, the correct number of numerics is to be made up, where necessary, by the insertion of zeros, e.g. "46N078W";

e) 2 ~~or 3~~to 5 characters being the coded identification of a ~~navigation aid (normally a VOR)~~ significant point, followed by 3 decimal numerics giving the bearing from the point in degrees magnetic followed by 3 decimal numerics giving the distance from the point in nautical miles. The correct number of numerics is to be made up, where necessary, by the insertion of zeros, e.g. a point at 180° magnetic at a distance of 40 nautical miles from VOR "FOJ" would be expressed as "FOJ180040".

. . .

Field Type 8 — Flight rules and type of flight

Format:– [a | b]*

SINGLE HYPHEN

(a) *Flight Rules*
1 LETTER as follows:
I if ~~IFR~~it is intended that the entire flight will be operated under the IFR
V if ~~VFR~~ it is intended that the entire flight will be operated under the VFR
Y if ~~IFR first~~the flight initially will be operated under the IFR, followed by one or more subsequent changes of flight rules
Z if ~~VFR first~~the flight initially will be operated under the VFR, followed by one or more subsequent changes of flight rules
Note.— If the letter Y or Z is used, the point or points at which a change of flight rules is planned is to be shown as indicated in Field Type 15.

* This field shall be terminated here unless indication of the type of flight is required by the appropriate ATS authority.

. . .

Field Type 10 — Equipment and Capabilities

Format:– [a] / [b]

SINGLE HYPHEN

(a) *Radio Communication, Navigation and Approach Aid Equipment and Capabilities*

1 LETTER as follows:

N no COM/NAV/approach aid equipment for the route to be flown is carried, or the equipment is unserviceable

OR

S Standard COM/NAV/approach aid equipment for the route to be flown is carried and serviceable (*See Note 1*)

AND/OR

ONE OR MORE OF THE FOLLOWING LETTERS to indicate the serviceable COM/NAV/approach aid equipment ~~serviceable~~and capabilities

A	~~(Not allocated)~~GBAS landing system	J7	CPDLC FANS 1/A SATCOM (Iridium)
B	~~(Not allocated)~~LPV (APV with SBAS)	K	~~(~~MLS~~)~~
C	LORAN C	L	ILS
D	DME	M1	~~Omega~~ATC RTF SATCOM (INMARSAT)
E1	~~(Not allocated)~~FMC WPR ACARS	M2	ATC RTF (MTSAT)
E2	D-FIS ACARS	M3	ATC RTF (Iridium)
E3	PDC ACARS	O	VOR
F	ADF	P1–P9	~~(Not allocated)~~Reserved for RCP
G	~~(~~GNSS~~)~~ (*See Note 2*)	~~Q~~	
H	HF RTF	R	~~(Not allocated)~~ ~~RNP type certification~~PBN approved *(see Note ~~5~~4)*
I	Inertial Navigation	T	TACAN
J1	~~(Data link)~~CPDLC ATN VDL Mode 2 *(see Note 3)*	U	UHF RTF
J2	CPDLC FANS 1/A HFDL	V	VHF RTF
J3	CPDLC FANS 1/A VDL Mode A	W	RVSM approved
		X	MNPS approved
J4	CPDLC FANS 1/A VDL Mode 2	Y	~~when prescribed by ATS~~VHF with 8.33 kHz channel spacing capability
J5	CPDLC FANS 1/A SATCOM (INMARSAT)	Z	Other equipment carried or other capabilities *(see Note ~~2~~5)*
J6	CPDLC FANS 1/A SATCOM (MTSAT)		

*Note 1.— If the letter S is used, s~~S~~tandard equipment is considered to be VHF RTF, ~~*ADF,*~~ VOR and ILS, unless another combination is prescribed by the appropriate ATS authority.*

Note 2.— If the letter G is used, the types of external GNSS augmentation, if any, are specified in Item 18 following the indicator NAV/ separated by a space.

Note ~~2~~5.— If the letter Z is used, specify in Item 18 the other ~~the~~ equipment carried or other capabilities~~is to be specified in Item 18~~, preceded by COM/ , ~~and/or~~ NAV/ and/or DAT, as appropriate.

Note 3.— ~~If the letter J is used, specify in Item 18 the equipment carried, preceded by DAT/ followed by one or more letters as appropriate.~~See RTCA/EUROCAE Interoperability Requirements Standard For ATN Baseline 1 (ATN B1 INTEROP Standard – DO-280B/ED-110B) for data link services air traffic control clearance and information/air traffic control communications management/air traffic control microphone check.

Note ~~4~~6.— Information on navigation capability is provided to ATC for clearance and routing purposes.

Note ~~5~~4.— ~~Inclusion of~~If the letter R is used, the performance based navigation levels that can be met are specified in Item 18 following the indicator PBN/. Guidance material on the application of performance-based navigation to a specific ~~indicates that an aircraft meets the RNP type prescribed for the~~ route segment~~(s)~~, route~~(s) and/~~or area ~~concerned~~ is contained in the Performance-Based Navigation Manual *(Doc 9613).*

OBLIQUE STROKE

(b) *Surveillance Equipment and capabilities*

ONE OR ~~TWO LETTERS~~MORE of the following descriptors, to a maximum of 20 characters, to describe the serviceable surveillance equipment ~~carried~~and/or capabilities on board:

SSR ~~equipment~~Modes A and C

~~N Nil~~
A Transponder — Mode A (4 digits — 4 096 codes)
C Transponder — Mode A (4 digits — 4 096 codes) and Mode C

SSR Mode S

~~X Transponder — Mode S without both aircraft identification and pressure-altitude transmission~~
E Transponder — Mode S, including aircraft identification, pressure-altitude and extended squitter (ADS-B) capability
H Transponder — Mode S, including aircraft identification, pressure-altitude and enhanced surveillance capability
I Transponder — Mode S, including aircraft identification, but no pressure-altitude capability
L Transponder — Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability
P Transponder — Mode S, including pressure-altitude, but no aircraft identification ~~transmission~~capability
~~I Transponder — Mode S, including aircraft identification transmission, but no pressure-altitude transmission~~

S Transponder — Mode S, including both pressure altitude and aircraft identification ~~transmission~~capability
X Transponder — Mode S with neither aircraft identification nor pressure-altitude capability

Note.– Enhanced surveillance capability is the ability of the aircraft to down-link aircraft derived data via a Mode S transponder.

ADS-B

B1 ADS-B with dedicated 1090 MHz ADS-B “out” capability
B2 ADS-B with dedicated 1090 MHz ADS-B “out” and “in” capability

U1 ADS-B “out” capability using UAT
U2 ADS-“out” and “in” capability using UAT
V1 ADS-B “out” capability using VDL Mode 4
V2 ADS-B “out” and “in” capability using VDL Mode 4

ADS-C

D1 ADS-C with FANS 1/A capabilities
G1 ADS-C with ATN capabilities

~~*ADS equipment*~~

~~D ADS capability~~

Alphanumeric characters not indicated above are reserved.

Note.– Additional surveillance application should be listed in Item 18 following the indicator SUR/ .

Examples: –S/A
–SC~~H~~HJ/C~~D~~B1
–SAF~~J~~R/S~~D~~V1

. . .

Field Type 13 — Departure aerodrome and time

Format:– * a b

SINGLE HYPHEN

(a) *Departure Aerodrome*

4 LETTERS, being

the ICAO four-letter location indicator allocated to the departure aerodrome as specified in Doc 7910, *Location Indicators*, or

ZZZZ if no ICAO location indicator has been allocated (*see Note 1*) or if the departure aerodrome is not known, or

AFIL if the flight plan has been filed in the air (*see Note 2*).

Note 1.— If ZZZZ is used, the name and location of the departure aerodrome is to be shown in the Other Information Field (see Field Type 18) if this Field Type is contained in the message.

Note 2.— If AFIL is used, the ATS unit from which supplementary flight data can be obtained is to be shown in the Other Information Field (Field Type 18).

* This field shall be terminated here in message types ~~CHG, CNL, ARR,~~ CPL, EST, CDN~~,~~ and ACP ~~and RQS~~. It shall be terminated here in message type RQP if the estimated off-block time is not known.

(b) *Time*

4 NUMERICS giving

the estimated off-block time (EOBT) at the aerodrome in (a) in FPL, ARR, CHG, CNL, ~~and~~ DLA and RQS messages transmitted before departure and in RQP message, if known, or

the actual time of departure from the aerodrome in (a) in ALR, DEP and SPL messages, or

the actual or estimated time of departure from the first point shown in the Route Field (see Field Type 15) in FPL messages derived from flight plans filed in the air, as shown by the letters AFIL in (a).

Examples: –EHAM0730
–AFIL1625

. . .

Field Type 14 — Estimate data

Format:– [a] / [b] [c]* [d] [e]

SINGLE HYPHEN

(a) *Boundary Point (see Note 1)*

The BOUNDARY POINT expressed either by a designator consisting of 2 to 5 characters, in Geographical Coordinates, in Abbreviated Geographical Coordinates, or by bearing and distance from a ~~designated~~significant point ~~(e.g. a VOR)~~.

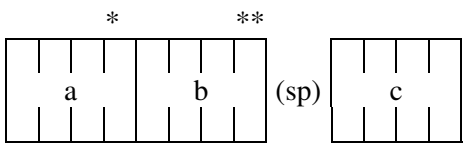
Note 1.— This point may be an agreed point located close to, rather than on, the FIR boundary.

Note 2.— See 1.6 for data conventions.

. . .

Field Type 16 — Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)

Format:–



See Note in margin on page A3-2~~0~~1.

FIELD TYPE 16

Previous type of field or symbol	*This type of field is used in*	*Next type of field or symbol*
15	ALR	18
15	FPL	18
13	CHG	~~22~~18
13	CNL	~~)~~18
13	DLA	~~)~~18
13	DEP	~~)~~18
13	ARR***	17
15	CPL	18
14	EST	)
13	CDN	22
13	ACP	)
13	RQS	~~)~~18
13	SPL	18

*** Only in case of a diversionary landing.

SINGLE HYPHEN

(a) *Destination Aerodrome*

4 LETTERS, being

the ICAO four-letter location indicator allocated to the destination aerodrome as specified in Doc 7910, *Location Indicators*, or

ZZZZ if no ICAO location indicator has been allocated.

Note.— If ZZZZ is used, the name and location of the destination aerodrome is to be shown in the Other Information Field (see Field Type 18).

* This field is to be terminated here in all message types other than ALR, FPL and SPL.

. . .

SPACE

(c) *Destination Alternate Aerodrome(s)* 4 LETTERS, being the ICAO four-letter location indicator allocated to an alternate aerodrome, as specified in Doc 7910, *Location Indicators* or ZZZZ if no ICAO location indicator has been allocated. *Note.— If ZZZZ is used, the name and location of the destination alternate aerodrome is to be shown in the Other Information Field (see Field Type 18).*	. *Note.— One further element of (c) should be added, as necessary, preceded by a space*

Examples: –EINN0630
–EHAM0645 EBBR
–EHAM0645 EBBR EDDL

Field Type 17 — Arrival aerodrome and time

Format:– a b * (sp) c

SINGLE HYPHEN

(a) *Arrival Aerodrome* 4 LETTERS, being the ICAO four-letter location indicator allocated to the arrival aerodrome as specified in Doc 7910, *Location Indicators*, or ZZZZ if no ICAO location indicator has been allocated. *Note.— If ZZZZ is used, the name or location of the arrival aerodrome is to be shown in the Other Information Field (see Field Type 18).*
(b) *Time of Arrival* 4 NUMERICS, giving the actual time of arrival.

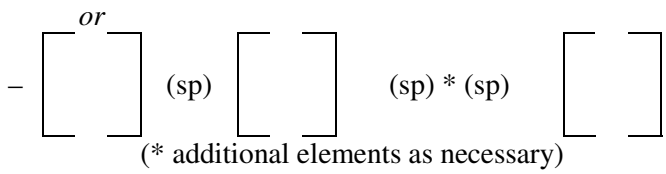
* This field is to be terminated here if an ICAO location indicator has been allocated to the arrival aerodrome.

Field Type 18 — Other information

Note.— Use of indicators not included under this item may result in data being rejected, processed incorrectly or lost.

Hyphens or oblique strokes should only be used as prescribed below.

Format:– a



SINGLE HYPHEN

(a) 0 (zero) if no other information,

OR,

Any other necessary information in the ~~preferred~~ sequence shown hereunder, in the form of the appropriate indicator selected from those defined hereunder followed by an oblique stroke and the information to be recorded:

STS/ Reason for special handling by ATS, e.g. a search and rescue mission, as follows:

ALTRV: for a flight operated in accordance with an altitude reservation;
ATFMX: for a flight approved for exemption from ATFM measures by the appropriate ATS authority;
FFR: fire-fighting;
FLTCK: flight check for calibration of navaids;
HAZMAT: for a flight carrying hazardous material;
HEAD: a flight with Head of State status;
HOSP: for a medical flight declared by medical authorities;
HUM: for a flight operating on a humanitarian mission;
MARSA: for a flight for which a military entity assumes responsibility for separation of military aircraft;
MEDEVAC: for a life critical medical emergency evacuation;
NONRVSM: for a non-RVSM capable flight intending to operate in RVSM airspace;
SAR: for a flight engaged in a search and rescue mission; and
STATE: for a flight engaged in military, customs or police services.

Other reasons for special handling by ATS shall be denoted under the designator RMK/.

PBN/ Indication of RNAV and/or RNP capabilities. Include as many of the descriptors below, as apply to the flight, up to a maximum of 8 entries, i.e. a total of not more than 16 characters.

	RNAV SPECIFICATIONS
A1	RNAV10 (RNP 10)
B1	RNAV 5 all permitted sensors
B2	RNAV 5 GNSS
B3	RNAV 5 DME/DME
B4	RNAV 5 VOR/DME
B5	RNAV 5 INS or IRS
B6	RNAV 5 LORANC
C1	RNAV 2 all permitted sensors
C2	RNAV 2 GNSS
C3	RNAV 2 DME/DME
C4	RNAV 2 DME/DME/IRU
D1	RNAV 1 all permitted sensors
D2	RNAV 1 GNSS
D3	RNAV 1 DME/DME
D4	RNAV 1 DME/DME/IRU
	RNP SPECIFICATIONS
L1	RNP 4
O1	Basic RNP 1 all permitted sensors
O2	Basic RNP 1 GNSS
O3	Basic RNP 1 DME/DME
O4	Basic RNP 1 DME/DME/IRU
S1	RNP APCH
S2	RNP APCH with BAR-VNAV
T1	RNP AR APCH with RF (special authorization required)
T2	RNP AR APCH without RF (special authorization required)

Combinations of alphanumeric characters not indicated above are reserved.

~~EET/ Significant points or FIR boundary designators and accumulated estimated elapsed times to such points or FIR boundaries, when so prescribed on the basis of regional air navigation agreements, or by the appropriate ATS authority.~~
~~Examples: EET/CAP0745 XYZ0830~~
~~EET/EINN0204~~

~~RIF/ The route details to the revised destination aerodrome, followed by the ICAO four-letter location indicator of the aerodrome. The revised route is subject to reclearance in flight.~~

~~Examples: RIF/DTA HEC KLAX~~
~~Examples: RIF/ESP G94 CLA YPPH~~
~~Examples: RIF/LEMD~~

~~REG/ The registration markings of the aircraft, if different from the aircraft identification in Item 7.~~

~~SEL/ SELCAL Code, if so prescribed by the appropriate ATS authority.~~

~~OPR/ Name of the operator, if not obvious from the aircraft identification in Item 7.~~

~~STS/ Reason for special handling by ATS, e.g. hospital aircraft, one engine inoperative, e.g. STS/HOSP, STS/ONE ENG INOP.~~

~~TYP/ Type(s) of aircraft, preceded if necessary by number(s) of aircraft, if ZZZZ is inserted in Item 9.~~

~~PER/ Aircraft performance data, if so prescribed by the appropriate ATS authority.~~

~~COM/ Significant data related to communication equipment as required by the appropriate ATS authority, e.g. COM/UHF only.~~

~~DAT/ Significant data related to data link capability, using one or more of the letters S, H, V and M, e.g. DAT/S for satellite data link, DAT/H for HF data link, DAT/V for VHF data link, DAT/M for SSR Mode S data link.~~

NAV/ Significant data related to navigation equipment, other than specified in PBN/, as required by the appropriate ATS authority. Indicate GNSS augmentation under this indicator, with a space between two or more methods of augmentation, e.g. NAV/GBAS SBAS.

COM/ Indicate communications applications or capabilities not specified in Item 10a.

DAT/ Indicate data applications or capabilities not specified in Item 10a.

SUR/ Include surveillance applications or capabilities not specified in Item 10b.

DEP/ Name and location of departure aerodrome, if ZZZZ is inserted in Item 13, or the ~~ICAO four-letter location indicator of the location of the~~ ATS unit from which supplementary flight plan data can be obtained, if AFIL is inserted in Item 13. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location as follows:

With 4 figures describing latitude in degrees and tens and units of minutes followed by “N” (North) or “S” (South), followed by 5 figures describing longitude in degrees and tens and units of minutes, followed by “E” (East) or “W” (West). Make up the correct number of figures, where necessary, by insertion of zeros, e.g. 4620N07805W (11 characters).

OR Bearing and distance from the nearest significant point, as follows:

The identification of the significant point followed by the bearing from the point in the form of 3 figures giving degrees magnetic, followed by the distance from the point in the form of 3 figures expressing nautical miles. In areas of high latitude where it is determined by the appropriate authority that reference to degrees magnetic is impractical, degrees true may be used. Make up the correct number of figures, where necessary, by insertion of zeros, e.g. a point of 180° magnetic at a distance of 40 nautical miles from VOR “DUB” should be expressed as DUB180040.

OR The first point of the route (name or LAT/LONG) or the marker radio beacon, if the aircraft has not taken off from an aerodrome.

DEST/ Name and location of destination aerodrome, if ZZZZ is inserted in Item 16. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described under DEP/ above.

DOF/ The date of flight departure in a six figure format (YYMMDD, where YY equals the year, MM equals the month and DD equals the day).

REG/ The nationality or common mark and registration mark of the aircraft, if different from the aircraft identification in Item 7.

EET/ Significant points or FIR boundary designators and accumulated estimated elapsed times from take-off to such points or FIR boundaries, when so prescribed on the basis of regional air navigation agreements, or by the appropriate ATS authority.

Examples: EET/CAP0745 XYZ0830
EET/EINN0204

SEL/ SELCAL Code, for aircraft so equipped.

TYP/ Type(s) of aircraft, preceded if necessary without a space by number(s) of aircraft and separated by one space, if ZZZZ is inserted in Item 9.

Example: –TYP/2F15, 5F5, 3B2

~~ALTN/ Name of destination alternate aerodrome(s), if ZZZZ is inserted in Item 16.~~

~~RALT/ Name of en-route alternate aerodrome(s).~~

CODE/ Aircraft address (expressed in the form of an alphanumerical code of six hexadecimal characters) when required by the appropriate ATS authority. Example: “F00001” is the lowest aircraft address contained in the specific block administered by ICAO.

DLE/ Enroute delay or holding, insert the significant point(s) on the route where a delay is planned to occur, followed by the length of delay using four figure time in hours and minutes (hhmm).

Example: –DLE/MDG0030

OPR/ ICAO designator or name of the aircraft operating agency, if different from the aircraft identification in item 7.

ORGN/ The originator’s 8 letter AFTN address or other appropriate contact details, in cases where the originator of the flight plan may not be readily identified, as required by the appropriate ATS authority.

Note.— In some areas, flight plan reception centres may insert the ORGN/ identifier and originator’s AFTN address automatically.

PER/ Aircraft performance data, indicated by a single letter as specified in the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), *Volume I — Flight Procedures*, if so prescribed by the appropriate ATS authority.

ALTN/ Name of destination alternate aerodrome(s), if ZZZZ is inserted in Item 16. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/ above.

RALT/ ICAO four letter indicator(s) for en-route alternate(s), as specified in Doc 7910, *Location Indicators*, or name(s) of en-route alternate aerodrome(s), if no indicator is allocated. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/ above.

TALT/ ICAO four letter indicator(s) for take-off alternate, as specified in Doc 7910, *Location Indicators*, or name of take-off alternate aerodrome, if no indicator is allocated. For aerodromes not listed in the relevant Aeronautical Information Publication, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/ above.

RIF/ The route details to the revised destination aerodrome, following by the ICAO four-letter location indicator of the aerodrome. The revised route is subject to reclearance in flight.

Examples:–RIF/DTA HEC KLAX
–RIF/ESP G94 CLA YPPH

RMK/ Any other plain language remarks when required by the appropriate ATS authority or deemed necessary.

Examples:–0
~~–~~STS/MEDEVAC
–EET/015W0315 020W0337 030W0420 040W0502
~~– STS/ONE ENG INOP~~
~~– DAT/S~~

. . .

Field Type 22 — Amendment

FIELD TYPE 22

Previous type of field or symbol	*This type of field is used in*	*Next type of field or symbol*
~~16~~18	CHG	**22 or)*
16	CDN	**22 or)*

* Indicates that further fields of this type may be added

. . .

RULES FOR THE COMPOSITION OF ATS MESSAGES
(See Sections 1.3 to 1.8 of this Appendix)

. . .

STANDARD ATS MESSAGES AND THEIR COMPOSITION

DESIGNATOR	. . .		. . .	Other information
MESSAGE TYPE				18
Alerting		ALR		
Radiocommunication failure		RCF		
Filed flight plan		FPL		
Delay		DLA		18
Modification		CHG		18
Flight plan cancellation		CNL		18
Departure		DEP		18
Arrival		ARR		
Current flight plan		CPL		
Estimate		EST		
Coordination		CDN		
Acceptance		ACP		
Logical acknowledgement message		LAM		
Request flight plan		RQP		18
Request supplementary flight plan		RQS		18
Supplementary flight plan		SPL		

. . .

The expression of position or route

The following alternative data conventions shall be used for the expression of position or route:

. . .

(e) 2 ~~or 3~~to 5 characters being the coded identification of a ~~navigation aid (normally a VOR)~~ significant point, followed by 3 decimal numerics giving the bearing from the point in degrees magnetic followed by 3 decimal numerics giving the distance from the point in nautical miles. The correct number of numerics is to be made up, where necessary, by insertion of zeros, e.g. a point at 180° magnetic at a distance of 40 nautical miles from VOR "FOJ" would be expressed as "FOJ180040".

. . .

2. Examples of ATS messages

. . .

2.2 Emergency messages

2.2.1 *Alerting (ALR) message*

2.2.1.1 *Composition*

. . .

– 9 Type of aircraft and wake turbulence category – 10 Equipment and capabilities

. . .

16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)

. . .

2.2.1.2 *Example*

The following is an example of an alerting message relating to an uncertainty phase, sent by Athens Approach Control to Belgrade Centre and other ATS units, in respect of a flight from Athens to Munich.

(ALR-INCERFA/LGGGZAZX/OVERDUE
–FOX236/A360024-IM
–C141/H-S/C~~D~~
–LGAT1020
–N0430F220 B9 3910N02230W/N0415F240 B9 IVA/N0415F180 B9
–EDDM0227 EDDF
–REG/A43213 EET/LYBE0020 EDMI0133 ~~REG/A43213~~ OPR/USAF RMK/NO POSITION REPORT SINCE DEP PLUS 2 MINUTES
–E/0720 P/12 R/UV J/LF D/02 014 C ORANGE A/SILVER C/SIGGAH
–USAF LGGGZAZX 1022 126.7 GN 1022 PILOT REPORT OVER NDB ATS UNITS ATHENS FIR ALERTED NIL)

2.2.1.2.1 *Meaning*

Alerting message — uncertainty phase declared by Athens due no position reports and no radio contact since two minutes after departure — aircraft identification FOX236 — IFR, military flight — Starlifter, heavy wake turbulence category, equipped with standard communications, navigation and approach aid equipment for the route, SSR transponder with Modes A (4 096 code capability) and C~~— ADS capability~~ — last assigned Code 3624 — departed Athens 1020 UTC — cruising speed for first portion of route 430 knots, first requested cruising level FL 220 — proceeding on airway Blue 9 to 3910N2230W where TAS would be changed to 415 knots and FL240 would be requested — proceeding on airway Blue 9 to Ivanic Grad VOR where FL 180 would be requested, maintaining TAS of 415 knots and FL240 would be requested — proceeding on airway Blue 9 to Munich, total estimated elapsed time 2 hours and 27 minutes — destination alternate is Frankfurt — aircraft registration A43213 — accumulated estimated elapsed

times at the Belgrade and Munich FIR boundaries 20 minutes and 1 hour and 33 minutes respectively — ~~aircraft registration A43213~~ — the aircraft is operated by the USAF — no position report has been received since 2 minutes after departure — endurance 7 hours and 20 minutes after take-off — 12 persons on board — portable radio equipment working on VHF 121.5 MHz and UHF 243 MHz is carried — life jackets fitted with lights and fluorescein are carried — 2 dinghies with orange covers are carried, have a total capacity for 14 persons — aircraft colour is silver — pilot's name is SIGGAH — operator is USAF — Athens approach control was the last unit to make contact at 1022 UTC on 126.7 MHz when pilot reported over GN runway locator beacon — Athens approach control have alerted all ATS units within Athens FIR — no other pertinent information.

. . .

2.3 Filed flight plan and associated update messages

2.3.1 *Filed flight plan (FPL) message*

2.3.1.1 *Composition*

(3 Message type, number and reference data – 7 Aircraft identification and SSR Mode and Code – 8 Flight rules and type of flight

– 9 Type of aircraft and wake turbulence category – 10 Equipment and capabilities

– 13 Departure aerodrome and time

– 15 Route (using more than one line if necessary)

– 16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)

– 18 Other information (using more than one line if necessary)

)

2.3.1.2 *Example*

The following is an example of a filed flight plan message sent by London Airport to Shannon, Shanwick and Gander Centres. The message may also be sent to the London Centre or the data may be passed to that centre by voice.

(FPL~~-TPR~~ACA101-IS
~~-B707M~~B773/H-CHO~~P~~V/C~~D~~
–EGLL1400
–N0450F310 ~~G1 UG1~~L9 UL9 STU285036/M082F310 ~~UG1~~UL9 ~~52N015W~~LIMRI

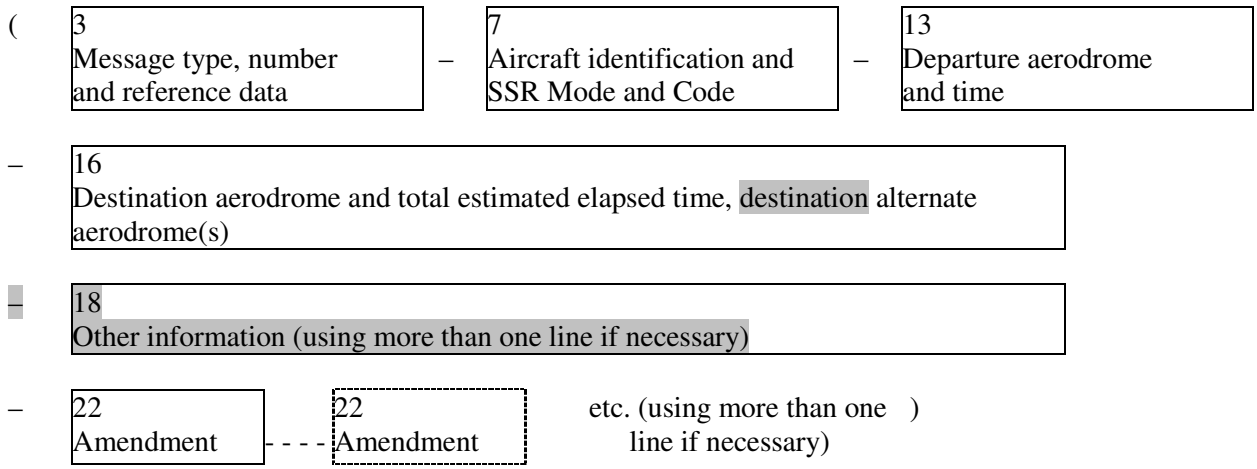
52N020W 52N030W 50N040W 49N050W
–CYQX0455 CYYR
–EET/EISNN0026 EGGX0111 020W0136 CYQX0228 040W0330 050W0415 SEL/FJEL)

2.3.1.2.1 *Meaning*

Filed flight plan message — aircraft identification TPRACA101 — IFR, scheduled flight — a Boeing 707, medium777-300, heavy wake turbulence category equipped with Loran C, HF RTF, VOR, Doppler, VHF RTF and SSR transponder with Modes A (4 096 code capability) and C ADS capability — departure aerodrome is London, estimated off-block time 1400 UTC — cruising speed and requested flight level for the first portion of the route are 450 knots and FL 310 — the flight will proceed on Airways Green 1Lima 9 and Upper Green 1Lima 9 to a point bearing 285 degrees magnetic and 36 NM from the Strumble VOR. From this point the flight will fly at a constant Mach number of .82, proceeding on Upper Green 1Lima 9 to 52N15WLIMRI; then to 52N20W; to 52N30W; to 50N40W; to 49N50W; to destination Gander, total estimated elapsed time 4 hours and 55 minutes — destination alternate is Goose Bay — captain has notified accumulated estimated elapsed times at significant points along the route, they are at the Shannon FIR boundary 26 minutes, at the Shanwick Oceanic FIR boundary 1 hour and 11 minutes, at 20W 1 hour and 36 minutes, at the Gander Oceanic FIR boundary 2 hours and 28 minutes, at 40W 3 hours and 30 minutes and at 50W 4 hours and 15 minutes — SELCAL code is FJEL.

2.3.2 *Modification (CHG) message*

2.3.2.1 *Composition*



2.3.2.2 *Example*

The following is an example of a modification message sent by Amsterdam Centre to Frankfurt Centre correcting information previously sent to Frankfurt in a filed flight plan message. It is assumed that both centres are computer-equipped.

(CHGA/F016A/F014-GABWE/A2173-EHAM0850-EDDF-DOF/080122-8/I-16/EDDN)

2.3.2.2.1 *Meaning*

Modification message – Amsterdam and Frankfurt computer unit identifiers A and F, followed by serial number (016) of this message sent by Amsterdam, repeat of computer unit identifiers followed by serial number (014) of the related filed flight plan message – aircraft identification GABWE, SSR Code 2173

operating in Mode A, en route from Amsterdam EOBT0850 to Frankfurt date of flight 22 Jan 2008 – Field Type 8 of the related filed flight plan message is corrected to IFR – Field Type 16 of the related filed flight plan is corrected, the new destination is Nürnberg.

2.3.3 *Flight plan cancellation (CNL) message*

2.3.3.1 *Composition*

(	3 Message type, number and reference data	–	7 Aircraft identification and SSR Mode and Code	–	13 Departure aerodrome and time	
–	16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)	)				
–	18 Other information (using more than one line if necessary)	)				

2.3.3.2 *Example 1*

The following is an example of a flight plan cancellation message sent by an ATS unit to all addressees of a filed flight plan message previously sent by that unit.

(CNL-DLH522-EDBB0900-LFPO-0)

2.3.3.2.1 *Meaning*

Flight plan cancellation message – cancel the flight plan of aircraft identification DLH522 – flight planned from Berlin EOBT0900 to Paris – no other information.

2.3.3.3 *Example 2*

The following is an example of a flight plan cancellation message sent by a centre to an adjacent centre. It is assumed that both centres are equipped with ATC computers.

(CNLF/B127F/B055-BAW580-EDDF1430-EDDW-0)

2.3.3.3.1 *Meaning*

Flight plan cancellation message – identifiers of sending and receiving ATC computer units F and B, followed by serial number (127) of this message, repeat of computer unit identifiers followed by serial number (055) of current flight plan message previously transmitted – cancel the flight plan of aircraft identification BAW580 – flight planned from Frankfurt EOBT1430 to Bremen – no other information.

2.3.4 *Delay (DLA) message*

2.3.4.1 *Composition*

(	3 Message type, number and reference data	–	7 Aircraft identification and SSR Mode and Code	–	13 Departure aerodrome and time

– | 16
Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s) |)

– | 18
Other information (using more than one line if necessary) |)

2.3.4.2 *Example*

The following is an example of a delay message from a departure aerodrome, or from a parent unit handling communications for a departure aerodrome, to each addressee of a filed flight plan message.

(DLA-KLM671-LIRF0900-LYDU-0)

2.3.4.2.1 *Meaning*

Delay message – aircraft identification KLM671 – revised estimated off-block time Fiumicino 0900 UTC destination Dubrovnik – no other information.

2.3.5 *Departure (DEP) message*

2.3.5.1 *Composition*

(| 3
Message type, number and reference data | – | 7
Aircraft identification and SSR Mode and Code | – | 13
Departure aerodrome and time

– | 16
Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s) |)

– | 18
Other information (using more than one line if necessary) |)

2.3.5.2 *Example*

The following is an example of a departure message from a departure aerodrome, or from a parent unit handling communications for a departure aerodrome, to each addressee of a filed flight plan message.

(DEP-CSA4311-EGPD1923-ENZV-0)

2.3.5.2.1 *Meaning*

Departure message – aircraft identification CSA4311 – departed from Aberdeen at 1923 UTC – destination Stavanger – no other information.

2.3.6 *Arrival (ARR) message*

2.3.6.1 *Composition*

(3 Message type, number and reference data – 7 Aircraft identification and SSR Mode and Code – 13 Departure aerodrome and time – 17 Arrival aerodrome and time)

2.3.6.2 *Example 1*

The following is an example of an arrival message sent from the arrival aerodrome (= destination) to the departure aerodrome.

(ARR-CSA406-LHBP-LKPR0913)

2.3.6.2.1 *Meaning*

Arrival message — aircraft identification CSA406 — departed from Budapest/Ferihegy — landed at Prague/Ruzyne Airport at 0913 UTC.

2.3.6.3 *Example 2*

The following is an example of an arrival message sent for an aircraft which has landed at an aerodrome for which no ICAO location indicator has been allocated. The SSR Code would not be meaningful.

(ARR-~~HELI13~~HHE13-EHAM-1030 DEN HELDER)

2.3.6.3.1 *Meaning*

Arrival message aircraft identification ~~HELI13~~HHE13 — departed from Amsterdam — landed at Den Helder heliport at 1030 UTC.

2.4 Coordination messages

2.4.1 *Current flight plan (CPL) message*

2.4.1.1 *Composition*

(3 Message type, number and reference data – 7 Aircraft identification and SSR Mode and Code – 8 Flight rules and type of flight – 9 Type of aircraft and wake turbulence category – 10 Equipment and capabilities – 13 Departure aerodrome and time – 14 Estimate data

– 15
Route (using more than one line if necessary)

– 16
Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)

– 18
Other information (using more than one line if necessary)
)

2.4.1.2 *Example 1*

The following is an example of a current flight plan message sent from Boston Centre to New York Centre on a flight which is en route from Boston to La Guardia Airport.

(CPL-UAL621/A5120-IS
–~~DC9~~A320/M-S/C~~D~~
–KBOS-HFD/1341A220A200A
–N0420A220 V3 AGL V445
–KLGA
–0)

2.4.1.3 *Example 2*

The following is an example of the same current flight plan message, but in this case the message is exchanged between ATC computers.

(CPLBOS/LGA052-UAL621/A5120-IS
–~~DC9~~A320/M-S/C~~D~~
–KBOS-HFD/1341A220A200A
–N0420A220 V3 AGL V445
–KLGA
–0)

Note.— The messages in Examples 1 and 2 are identical except that the Message Number of Example 2 does not appear in Example 1.

2.4.1.4 *Meaning*

Current flight plan message [with sending unit identity (BOS) and receiving unit identity (LGA), followed by the serial number of this message (052)] — aircraft identification UAL621, last assigned SSR Code 5120 in Mode A — IFR, scheduled flight — one ~~DC9~~A320, medium wake turbulence category, equipped with standard communications, navigation and approach aid equipment for the route and SSR transponder with Modes A (4 096 code capability) and C ~~— ADS capability —~~ departed Boston — the flight is estimated to cross the Boston/New York "boundary" at point HFD at 1341 UTC, cleared by the Boston Centre at altitude 22 000 feet but to be at or above altitude 20 000 feet at HFD — TAS is 420 knots, requested cruising level is altitude 22 000 feet — the flight will proceed on airway V3 to

reporting point AGL thence on airway V445 — destination is La Guardia Airport — no other information.

2.4.2 *Estimate (EST) message*

2.4.2.1 *Composition*

(3 Message type, number and reference data – 7 Aircraft identification and SSR Mode and Code – 13 Departure aerodrome and time

– 14 Estimate data – 16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s))

• • •

2.4.3 *Coordination (CDN) message*

2.4.3.1 *Composition*

(3 Message type, number and reference data – 7 Aircraft identification and SSR Mode and Code – 13 Departure aerodrome and time

– 16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)

– 22 Amendment - - - - 22 Amendment etc. (using more than one) line if necessary)

• • •

2.4.4 *Acceptance (ACP) message*

2.4.4.1 *Composition*

(3 Message type, number and reference data – 7 Aircraft identification and SSR Mode and Code – 13 Departure aerodrome and time

– 16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s))

• • •

2.5 Supplementary messages

2.5.1 *Request flight plan (RQP) message*

2.5.1.1 *Composition*

(	3 Message type, number and reference data	–	7 Aircraft identification and SSR Mode and Code	
–	13 Departure aerodrome and time	–	16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)	)
–	18 Other information (using more than one line if necessary)			)

2.5.1.2 *Example*

The following is an example of a request flight plan message sent by a centre to an adjacent centre after receipt of an estimate message, for which no corresponding filed flight plan message had been received previously.

(RQP-PHOEN-EHRD-EDDL-0)

2.5.1.2.1 *Meaning*

Request flight plan message – aircraft identification PHOEN departed from Rotterdam – destination Düsseldorf – no other information.

2.5.2 *Request supplementary flight plan (RQS) message*

2.5.2.1 *Composition*

(	3 Message type, number and reference data	–	7 Aircraft identification and SSR Mode and Code	–	13 Departure aerodrome and time
–	16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)				)
–	18 Other information (using more than one line if necessary)				)

2.5.2.2 *Example*

The following is an example of a request flight plan message sent by an ATS unit to the ATS unit serving the departure aerodrome requesting information contain in the flight plan form, but not transmitted in the filed or current filed flight plan messages.

(RQS-KLM405/A4046-EHAM-CYMX-0)

2.5.2.2.1 *Meaning*

Request supplementary flight plan message – aircraft identification KLM405/SSR Code 4046 operating in Mode A – departure aerodrome is Amsterdam – destination aerodrome is Mirabel – no other information.

2.5.3 *Supplementary flight plan (SPL) message*

2.5.3.1 *Composition*

(	3 Message type, number and reference data	–	7 Aircraft identification and SSR Mode and Code	–	13 Departure aerodrome and time

–	16 Destination aerodrome and total estimated elapsed time, destination alternate aerodrome(s)

. . .

— — — — — — — — —

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Ref.: AN 13/2.1-09/9

6 February 2009

Subject: Guidance for implementation of flight plan information to support Amendment 1 of the P*rocedures for Air Navigation Services — Air Traffic Management,* Fifteenth Edition (PANS-ATM, DOC 4444)

Action required: Coordinate the transition to the new ICAO flight plan

Sir/Madam,

1. I have the honour to draw your attention to the content of Amendment 1 to the *Procedures for Air Navigation Services — Air Traffic Management,* Fifteenth Edition (PANS-ATM, Doc 4444) related to the amended flight plan form and new flight planning procedures.

2. The nature and scope of the amendment, as described in State letter AN 13/2.1-08/50, is to update the ICAO model flight plan form in order to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, while taking into account compatibility with existing systems, human factors, training, cost and transition aspects.

3. Considering that the transition from the current flight plan form and associated requirements to the new flight plan may present challenges for States and organizations involved in the processing of flight plans, ICAO has developed the guidance contained in the Attachment. The primary purpose of this guidance is to support a coordinated global effort during the transition period so that a successful and coordinated transition is achieved by the applicability date of 15 November 2012.

4. To support the transition, a public website is being developed by ICAO where States, Air Navigation Service Providers (ANSPs) and airspace users will be able to find information regarding the implementation status of the Amendment and where the most common issues and difficulties encountered will be discussed. States will be notified as soon as the site is available.

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5. May I, therefore, request that all efforts be made to ensure a smooth transition to the new flight plan and that particular attention be paid to the pages referring to the conversion of new items 10 and 18 to the present items 10 and 18, which concern aircraft equipment and capabilities.

Accept, Sir/Madam, the assurances of my highest consideration.

Taïeb Chérif
Secretary General

Enclosure:

Guidance for implementation of flight plan information to support Amendment 1 of the *Procedures for Air Navigation Services — Air Traffic Management,* Fifteenth Edition (PANS-ATM, DOC 4444)

ATTACHMENT to State letter AN 13/2.1 – 09/9

Guidance for implementation of flight plan information to support Amendment 1 of the P*rocedures for Air Navigation Services — Air Traffic Management,* Fifteenth Edition (PANS-ATM, DOC 4444)

1. INTRODUCTION

1.1. The guidance contained herein is provided to assist airspace users and Air Navigation Service Providers (ANSP) to implement the flight planning changes incorporated by Amendment 1 to Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444) Fifteenth Edition.

1.2. Amendment 1 stems from the work of the Flight Plan Study Group (FPLSG). The nature and scope of the amendment is to update the ICAO model flight plan form in order to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, while taking into account compatibility with existing systems, human factors, training, cost and transition aspects.

1.3. The changes were announced by ICAO in State letter AN 13/2.1-08/50 dated 25 June 2008 and will become applicable on 15 November 2012.

1.4. The changes have considerable consequences on ANSP flight data processing systems that check and accept flight plans and related messages, use flight plan data in displays for controller reference, use data in ANSP automation and which support communication between ANSPs as the flight progresses. Preparation for the changes should therefore be made well in advance of the applicable date.

1.5. The changes also have consequences for airspace users. If a flight plan with new content is sent to an ANSP that has not prepared to accept the new content then it is likely that some information will be lost, misinterpreted or cause a rejection of the flight plan.

1.6. No start date has been given for implementation of the flight planning changes to commence; however, one reason for the State letter is to support the updating of flight plan data processing systems. The transition period for the changes is therefore from 25 June 2008 until 15 November 2012.

1.7. It is recognized that changes will be implemented by airspace users and ANSPs on individual schedules due to individual needs, however some coordination will occur.

1.8. It is essential to the success of this implementation that all airspace users and ANSPs be able to submit and process flight information in accordance with Amendment 1 to the PANS-ATM by 15 November 2012, as processing via present methods is not assured after that date.

1.9. This guidance does not change any provision in Annex 2 — *Rules of the* Air or the PANS-ATM regarding completion and acceptance of a flight plan.

2. OBJECTIVE

2.1. The purpose of the guidance contained herein is to support a coordinated global effort during the transition period so that a successful transition is achieved by the applicability date of 15 November 2012.

3. APPLICABILITY

3.1. This guidance applies to airspace users, ANSPs and Planning and Implementation Regional Groups (PIRGs). Note that flight planning services and related organizations involved in the processing of flight plans are considered part of the airspace user community and, as such, are covered under this guidance.

3.2. This document presents guidelines which should be considered when developing implementation plans for this amendment. Adherence to these guidelines will mitigate risks associated with the technical challenges inherent during the transition period and assure that users are able to meet flight planning requirements as individual ANSPs implement changes.

3.3. This document applies with immediate effect and continues until implementation of Amendment 1 to the PANS-ATM is complete.

4. SCOPE

4.1. This guidance is limited to transitioning to flight planning and Air Traffic Services (ATS) message changes defined in Amendment 1 to the PANS-ATM, including message content and submission instructions.

5. FLIGHT PLANNING ENVIRONMENT

5.1. PRESENT is defined as the present flight planning and ATS message formats as defined in the current version of the PANS-ATM.

5.2. NEW is defined as the flight planning and ATS message formats as specified in Amendment 1 to the PANS-ATM.

5.3. In order to allow performance case considerations to drive individual airspace user and ANSP implementation schedules, the ATM system will need to simultaneously support both PRESENT and NEW for a period of time.

5.4. Amendment 1 to the PANS-ATM contains changes to the length and content of items. The changes to content are as follows:

- Change the way aircraft equipage and capabilities are communicated to provide more details;
- Provide additional means of describing route way points (specifically bearing and distance from points other than navigation aids); and
- Permit specification of the date of flight in a standardised manner.

5.5. The present flight planning environment supports a variety of means of filing flight plans. For example flight plans can be filed directly by the airspace user to each ANSP individually or flight

plans can be filed by the airspace user at one location and then the ATM system distributes the flight plan. Amendment 1 does not specifically change these options; however the means of transitioning to Amendment 1 may impose some requirements during the transition.

5.6. The present ATM system supports a variety of means of ANSPs communicating flight plan data between ANSP systems, for example use of coordination messages where Amendment 1 implies changes of content.

6. IMPLEMENTATION GUIDELINES

6.1. These guidelines have been developed to facilitate concurrent use of both PRESENT and NEW by airspace user and ANSP flight data processing systems during the transition period.

6.2. **Guideline 1**

a) As each ANSP transitions to NEW, it is essential that they also support PRESENT until the applicability date of 15 November 2012.

b) There is no requirement for ANSPs to accept and process PRESENT after the applicability date, unless specified by the appropriate authority.

c) This guideline relates to the situation when some ANSPs and/or airspace users do not implement the flight planning changes until the end of the transition period.

6.3. **Guideline 2**

a) PIRGs are encouraged to plan and publish regional implementations sufficiently in advance of the applicability date so that airspace users and ANSPs can respond to and resolve any unforeseen operational issues.

b) It is anticipated that implementation will occur progressively as each PIRG works with their member States/international organizations and airspace users to coordinate a regional transition prior to 15 November 2012.

c) Transition plans should encourage all ANSPs to transition to NEW a certain period of time prior to 15 November 2012 to allow airspace users a transition period to NEW before the applicability date.

d) Transition plans should take into account that the airspace user may not be able to make use of the new opportunities provided by NEW until an ANSP has transitioned. Even then, use of NEW may be restricted in its application if the flight still involves ANSPs who have not yet transitioned.

6.4. **Guideline 3**

a) During the transition period and after an ANSP has advised that they can accept NEW, the determination to file NEW or PRESENT with that ANSP is the choice of the airspace user.

b) It is expected that airspace users will make the decision on what format to file based on performance gains which may be achieved through capability information in Items 10 and/or 18 of NEW.

c) It is intended that all airspace users will file NEW from the applicability date forward, as using PRESENT is not assured after that date.

***Note* – The following guidelines apply only to situations where ANSPs affected by a flight have not all transitioned to NEW.**

6.5. **Guideline 4**

a) During the transition period when not all ANSPs affected by a flight have transitioned to NEW, the airspace user must ensure that PRESENT is filed with ANSPs who have not yet transitioned.

b) This can be achieved by the airspace user filing only PRESENT with all ANSPs (as ANSPs supporting NEW will also support PRESENT during transition).

c) ANSPs using PRESENT may misinterpret, and may reject, flight plan information that is filed more than 24 hours in advance of flight. Filing more than 24 hours in advance of flight cannot be used if one or more ANSPs affected by a flight have not transitioned (unless those ANSPs already support filing more than 24 hours in advance of flight). Although ANSPs using NEW could accept the flight plan they may not be able to pass essential coordination to ANSPs using PRESENT.

d) The airspace user may choose to file NEW to ANSPs that have transitioned and PRESENT to ANSPs that have not transitioned. However, without special transitional procedures, a situation can occur where the NEW would only be useable until the first ANSP along route of flight using PRESENT. This is because the ANSP using NEW will not be able to coordinate NEW with ANSPs using PRESENT.

6.6. **Guideline 5**

a) To facilitate user decisions on whether to file PRESENT, NEW or a combination of PRESENT and NEW, ICAO will maintain a website listing each ANSP's ability to accept PRESENT or NEW.

b) This information which will be publicly available is in addition to the normal methods of communication between an ANSP and its airspace users.

c) Each ANSP will communicate, via State and ICAO Regional Offices, their ability to accept NEW to ICAO as soon as possible so that ICAO can ensure that complete and updated information is posted on the website. An ANSP advising of having completed transition to NEW is also indicating that they can coordinate with other ANSPs who have transitioned to NEW.

6.7. **Guideline 6**

a) During the transition period, ANSPs who accept NEW may need to convert flight information to PRESENT for coordination with adjacent ANSPs who have not yet transitioned.

b) It is strongly recommended for consistency that all ANSPs utilize the conversion table provided below so that airspace users and ANSPs have a common understanding of how NEW will be converted to PRESENT.

c) PIRGs, States and ANSPs should be aware that valuable planning information may be lost during the conversion process, as shown in the conversion table.

d) There is no intent for PRESENT to be converted to NEW during the transition period.

7. CONVERSION OF NEW ITEMS 10 and 18 TO PRESENT ITEMS 10 and 18

It is strongly recommended that all ANSPs utilize the table below to convert NEW Items 10 and 18 to the PRESENT for coordination with adjacent ANSPs which only accept PRESENT.

- Different agreements may be worked out between ANSPs for Item 18 information if the conversion would cause the message to be rejected by an ANSP which only accepts PRESENT.

- CAUTION: Some information will be lost from NEW during conversion, including certain information about capabilities, and information held in Item 18 indicators which do not exist in PRESENT such as DOF, DLE and TALT. As a partial mitigation, any information which would otherwise be lost from NEW may be translated into a single free text following RMK/ in Item 18 of PRESENT.

	NEW data in these columns		**Converts to PRESENT data in these columns**	
Com-Nav	**Item 10**	**Item 18**	**Item 10**	**Item 18**
	N		N	
	S		VOL	
	SF		S	
	A		Z	NAV/GBAS
	B		Z	NAV/LPV
	C		C	
	D		D	
	E1		J	DAT/n
	E2		J	DAT/n
	E3		J	DAT/n
	F		F	
	G	NAV/nnnn	G	
	H		H	
	I		I	
	J1		J	DAT/V
	J2		J	DAT/H
	J3		J	DAT/V

	J4		J	DAT/V
	J5		J	DAT/S
	J6		J	DAT/S
	J7		J	DAT/S
	K		K	
	L		L	
	M1		Z	COM/INMARSAT
	M2		Z	COM/MTSAT
	M3		Z	COM/IRIDIUM
	O		O	
	P1-P9(Reserved)			
	R	PBN/nn	Z	NAV/nnnn

	NEW data in these columns		**Converts to PRESENT data in these columns**	
Com-Nav	**Item 10**	**Item 18**	**Item 10**	**Item 18**
	T		T	
	U		U	
	V		V	
	W		W	
	X		X	
	Y		Y	
	Z	COM/NAV/DAT	Z	COM/ NAV/

Sur	N		N	
	A		A	
	C		C	
	E		S	
	H		S	
	I		I	
	L		S	
	P		P	
	S		S	
	X		X	
	B1			
	B2			
	U1			
	U2			
	V1			
	V2			
	D1		D	
	G1		D	

— END —

ATTACHMENT C TO APPENDIX E

STRATEGY FOR THE IMPLEMENTATION OF AMENDMENT 1 TO THE 15TH EDITION OF THE ICAO PANS-ATM (DOCUMENT 4444) IN THE CAR/SAM REGIONS

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1. Objective

The purpose of this document is to establish the CAR/SAM Regions' strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM (Doc 4444), pursuant to Conclusion 15/35 of GREPECAS.

2. General considerations

ICAO, taking into consideration that:

- Dynamic management of information will provide the most appropriate and integrated vision of ATM status in historical terms--past, present, and planned or future---and will serve as a basis for decision-making by the whole ATM community;

- The *Global Air Traffic Management Operational Concept* (Doc 9854) requires information management actions to support ATM operations with accurate, quality, and timely information; and

- ATM requirement N^{o} 87 of the *Manual on Air Traffic Management System Requirements* (Doc 9882) defines that 4-D paths will be used in traffic synchronisation applications, with a view to attaining the performance objectives of the ATM system. It also clarifies that automation in both "ground" and "air" applications will be fully used to create an efficient and safe air traffic flow in all flight phases.

Informed the States, through letter AN13/2.1-08/50 of 25 June 2008, about the publication of Amendment 1 to Doc. 4444 (PANS-ATM), aimed at updating the ICAO flight plan (FPL) form to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, while taking into account compatibility with existing systems, human factors, training, cost, and transition aspects.

GREPECAS/15, when assessing the establishment of the new CNS/ATM Subgroup and its terms of reference and work programme, reviewed the new flight plan model. In this regard, considering that a CAR/SAM regional strategy will need to be established for its implementation, it formulated Conclusion 15/35 "*Implementation of the new ICAO flight plan model*" requesting States to adopt the necessary measures to prepare for the transition, and also requesting the CNS/ATM//SG to establish a contributory body to develop such transition strategy.

A previous analysis carried out in some CAR/SAM States has remarked that the implementation of the new flight plan format will impact on, among other systems, the flight plan dealing subsystems, the interface communications with other systems, in the screen control human-machine interface (IHM), and in the recording and re-visualization subsystems.

In view of the above, an initial plan has been developed, together with a description of the strategy for the implementation of said amendment.

3. Principles

In preparing this document, the following aspects have been considered:

1. The sovereign will of the States;

2. It is a guide for CAR/SAM States to develop their action plans for the implementation of the contents of Amendment 1 to Doc. 4444.

4. Scope

This document applies to all CAR/SAM States, Territories and International Organizations, specifically to all air navigation service providers and airspace users.

5. Reference documents

This strategy follows ICAO recommendations, as contained in the following documents:

a) ICAO PANS-ATM, 15th Edition (Doc 4444)

b) Amendment 1 to the 15th Edition of Doc 4444;

c) Directives for the incorporation of flight plan information, pursuant to Amendment 1 to the Procedures for air navigation services - Air traffic management, 15th edition (PANS-ATM, Doc 4444)(State letter AN 13/2.1-09/9 of 6 February 2009); and

d) GREPECAS 15 final report.

6. Analysis

6.1. Amendment 1 to the 15th edition of Doc 4444;

ICAO considered that, in order to meet the needs of aircraft with advanced capabilities and the evolving requirements of automated air traffic management (ATM) systems, the flight plan forms need to be updated.

In this regard, it published Amendment 1 to PANS-ATM, Doc 4444 - 15th Edition, which contains, basically, the following changes:

1. Flight plan

    a. Flight plan form: operators and air traffic service units should comply with the restrictions established in aeronautical information publications (AIPs);

    b. Filing of flight plan: changes in the deadlines for filing flight plans;

    c. Item 7: Aircraft identification: use of alphanumeric characters;

    d. Item 8: Flight rules: specification of one or more items of change in flight rules;

    e. Item 10: Equipment: changes in the designation of equipment and capabilities

f. Item 13: Aerodrome of departure and time

g. Item 15: Route

h. Item 16: Aerodrome of destination and total estimated duration, alternate destination aerodromes

i. Item 18: Other data

2. Messages from air traffic services

a. Composition of CHG, CNL, DLA, DEP, RQP and RQS messages

6.2. Implementation directives

In Letter AN 13/2.1-09/9, dated 6 February 2009, ICAO defines the directives for the incorporation of flight plan information pursuant to Amendment 1 to the Procedures for air traffic services.

In general, ICAO highlights that the changes have significant repercussions for ANSP flight data processing systems that check and accept flight plans and related messages, use flight plan data from displays as a reference for controllers, use data for ANSP automation, and facilitate communications among ANSPs during flight, and also have consequences for airspace users.

Although a date has not been established for the implementation of flight planning changes, the transition is expected to begin on 25 June 2008 and finish on 15 November 2012.

It also recognises that the changes will be applied according to timetables specific to each ANSP and airspace user, based on their own needs, but there shall be some coordination.

Finally, it stresses that all those involved should be in a position to submit and process flight information in keeping with Amendment 1 to the PANS-ATM by 15 November 2012.

Some considerations regarding the planning environment follow:

1. EXISTING means the existing flight planning formats and ATS messages defined in the current version of the PANS-ATM;

2. NEW means the flight planning formats and ATS messages specified in Amendment 1 to the PANS-ATM;

3. The ATM system shall support simultaneously the EXISTING and NEW information for some period of time, in order to have time to deal with individual performance cases;

4. Amendment 1 does not change the filing of flight plans through different means (individual filing of flight plans before each ANSP, filing of flight plans at one location and then the ATM system distributes them), but the transition to the implementation of Amendment 1 might entail some requirements during the transition period;

5. The Amendment makes changes to the content of flight plan messages exchanged between ANSPs.

A summary of the contents of ICAO directives follows:

Directriz 1. Recommends that ANSPs be capable of operating with the two types of flight plan information, EXISTING and NEW, during the transition period. ANSPs are not required to accept and process EXISTING data after 15 November 2012. It applies to cases in which some ANSPs and/or airspace users do not implement flight plan changes until the end of the transition period.

Directriz 2. Regional planning and implementation groups are encouraged to plan and publish the changes sufficiently in advance to the date of application. It considers that transition plans should take into account the fact that it is possible that airspace users will not be able to use the new opportunities offered by the NEW information until such time that the ANSPs have made the transition and, even then, the use of the NEW information could be limited in its application if flights continue to involve ANSPs that have not made the transition yet.

Directriz 3. Clarifies that airspace users will determine whether they will submit NEW or EXISTING information to the ANSP during the transition period and after the ANSP has notified that it can accept the NEW information.

Directriz 4. In the event that not all ANSPs have made the transition to the NEW information, airspace users must make sure that the EXISTING information is submitted to the ANSPs that have not made the transition yet. It stresses the concern that ANSPs that use EXISTING information might misinterpret and reject the information submitted by airspace users more than 24 hours before the flight, as well as the case in which ANSPs that use the NEW information will not be in a position to transmit essential coordination to the ANSPs that use the EXISTING information.

Directriz 5. Informs that ICAO will maintain a website containing the list of capabilities of each ANSP to accept EXISTING or NEW information. Each ANSP will communicate to the respective ICAO Regional Offices, as soon as possible, its capability of accepting the NEW information.

Directriz 6. To supplement Directive 4, it is noted that the ANSPs that accept the NEW information could translate flight information into EXISTING information for purposes of coordination with adjacent ANSPs that have not made the transition.

6.3. Current scenario in the CAR/SAM Regions

Currently, the CAR/SAM Regions show different levels of technological evolution in terms of ATM automation, which can be classified into the following groups:

- States that have automated systems;
- States that have ATM automated systems and are in the process of updating them;
- States that do not have ATM automated systems, but are in the phase of implementing them in the short term;
- States that do not have ATM automated systems and no short- or medium-term plans to purchase them.

The implementation strategy must take into account the different degrees of technology evolution in each Region.

The main means used for the transmission of flight plans in the Region is the AFTN, which is in the process of transition to the AMHS system. It is expected that, by 2015, practically all CAR/SAM States will have the AMHS system installed.

6.4. Impact

Based on the changes defined by ICAO, on the directives for the implementation of these changes and on the current scenario of the CAR/SAM Regions, a macro analysis is made of the impact on ATM systems, whether automated or not, as well as on data communication systems, both at the technical and operational level.

6.4.1. Technical impact

For States that do not have ATM automated systems, the changes in the new flight plan format would only affect data communication systems based on the AFTN or the AMHS, basically associated to the human-machine interface (IMH) at the system terminals available at AIS offices and other specific locations for the entry of flight plans.

It must be noted that changes in the flight plan format involve the introduction of more options for filling the boxes in the form, and this could imply more errors in the generation of messages from terminals, which do not have the capability of checking data consistency, only message syntax.

It must be noted that these changes in the flight plan form introduce many options that can increase the likelihood of errors when completing it.

In States that have ATM automated systems, changes have a significant technical impact, and it will be necessary, at least, to make adjustments in the sub-systems dealing with flight plan processing, communication interface with other systems, recording and re-display, and in the HMI of control displays.

Such adjustments must take into account, at least, the following aspects:

- The incorporation of all the changes contained in Amendment 1 and described in item 6.1 of this document;
- The provision to the air traffic controller of all the information required for air traffic planning and management, including the alerts of aircraft capability changes;
- Enabling the correct transmission of flight plan information, EXISTING of NEW, to all the control centres involved;
- A clear definition of box sizes and their respective sub-divisions, as well as data sequencing (for example, the sequence for the inclusion of data in Box 10);
- Including the updating of all the technical documentation of the system; and
- Early testing to validate the changes.

Consequently, the effort of modifying these systems must be considered, also taking into account the difficulties inherent to technological obsolescence and insufficient technical training of maintenance personnel, which may cause additional financial expenditures due to the need to hire third parties, and a higher risk of failure.

For States that are in the process of purchasing new automated systems, whether or not for changing the existing systems, the impact will be on the specification of such systems, which must be suitable to process the changes defined in the amendment.

Another important aspect is that ICAO considers a period of transition, in which ANSPs must be capable of processing EXISTING and NEW information, which implies making adjustments to the software so that it can recognise what format is being used.

6.4.2. Operational impact

The changes have a direct impact on operational personnel, especially air traffic controllers and flight plan operators.

However, many variables need to be considered, as well as the relationships between the data in the different boxes of the FPL (for example, boxes 10 and 18), which may change depending on aircraft status.

This impact is reduced if the ATM automated system can provide the air traffic controller with the information required for air traffic planning, and send alerts whenever there is a change in the scenario with respect to the data declared in the flight plan.

Consideration should also be given to the operational difficulty that will exist during the transition period, when it must be possible to operate with the two types of information: EXISTING and NEW

It is also necessary to clearly and formally define those aspects that are not totally defined in Amendment 1 and in the directives; for example, the use of item COM/NAV, in Box 10, where the letter S represents VHF RTF, VOR or ILS standard equipment, without making reference to NDB.

In order to mitigate the impact, a significant amount of training must be provided to the personnel on both the use of the new resources of the automated system and the manual processing of flight plan data, as well as on the adjustment of operational models and the clear definition of controversial issues.

7. Implementation strategy

7.1. Critical criteria

The following aspects must be taken into account for the implementation of Amendment 1 in the CAR/SAM Regions:

- Make sure that, by 15 November 2012, all States and airspace users implement all the changes contained in Amendment 1, and not just some selected aspects;

- States that do not fully implement the amendment will be obliged to publish the non-conformities in their AIPs as "SIGNIFICANT DIFFERENCE" before 15 November 2012. Likewise, failure to implement the changes will be considered as a deficiency and will be included in the List of Deficiencies of the SAM Region; and

- Make sure that, as of 15 November 2012, all States and airspace users will accept and disseminate only information of the NEW flight plan format and of associated ATS messages, and that the capability of processing the EXISTING format is deactivated.

7.2. Preparation

In order to succeed in the implementation of the changes, CAR/SAM States need first to develop an action plan that takes into account the impact of the change on their systems, taking into consideration the aspects included in this strategy.

A project for the implementation of the new format of the flight plan will oversee the administrative aspects of the regional implementation. In order to succeed, the States, under the coordination of the ICAO Regional Offices and GREPECAS, need to develop their action plans based on the impact on their systems, taking into account the changes, directives and critical criteria defined above. Such plans must contain, as a minimum, the following topics:

- Classification of the level of evolution of their systems;

- A detailed assessment of the technical and operational impact;

- The solution to mitigate the impact, with the respective implementation timetable and those responsible for its execution;

- Deadline for the implementation of the solutions;

- Solution validation tests;

- Technical and operational training programmes; and

- Contingency measures.

Plans must be submitted to the ICAO NACC and SAM Regional Offices, which will monitor the following tasks:

TASK	START	END	RESPONSIBLE PARTY
Ensure that automated system requirements contain all the changes of the FPL form	2009	2012	Each State will indicate who is the responsible party
Ensure the proper modification of ATM automated systems for a correct analysis of the information, and the identification of the order in which messages are received, to make sure that there are no data interpretation errors.	2009	2012	Each State will indicate who is the responsible party
Carry out a comparative analysis between flight plan data processed in the NEW format and the same data treated in the EXISTING format.	2010	2011	Each State will indicate who is the responsible party

States must also agree on a joint definition of any items that are not clearly specified in the amendment before making adjustments to their systems.

7.3. Transition

The action taken in this transition phase must:

- Follow GREPECAS guidance;
- Follow the ICAO directives described in paragraph 6.2;
- Act together with the implementation coordinator;
- Carry out the activities foreseen in the action plan to mitigate technical and operational impact;
- Recognise that airspace users will only obtain benefits if the changes are implemented jointly.

In the CAR/SAM Regions, the transition period during which the ANSPs must be capable of processing both flight plan formats--EXISTING and NEW--starts on 1 July 2012 and ends on 15 November 2012.

In order to meet these time frames and harmonize implementation with other ICAO regions, delivery and testing of software and system changes shall be completed no later than 30 June 2012.

Consequently, States are urged to complete the implementation of the NEW format between 1 April and 30 June 2012, and not to use this NEW format before 1 April 2012.

Therefore, States must maintain coordination with respect to the evolution of action plans, and report any changes in dates, deadlines, etc., using the period 18 July 2011 to 1 April 2012 to deliver and test updated ANSP system software to support NEW message formats, while continuing support for PRESENT message formats.

Likewise, airspace users must take steps to adjust their systems in a precise and correct manner, in accordance to the NEW and EXISTING flight plan formats.

Implementation coordination meetings will be held periodically in order to assess the plans, so that States and ANSPs will be confident that the region can implement Amendment 1 between 1 April and 30 June 2012.

Each State shall designate a contact person to coordinate with ICAO and other States during the transition to the new flight plan format.

7.4. Post-transition

States must discontinue the processing of the EXISTING flight plan format on 15 November 2012.

They must also ensure that ATM systems, whether or not automated, process all the information contained in the NEW flight plan format correctly, and provide support for their operation.

Any difficulties observed must be assessed and resolved by the parties involved, ANSPs and/or airspace users.

8. Administrative aspects

States must assess all the documents involved, including Letters of Operational Agreement, Contingency Plans, and Operational Models.

For all purposes, this document establishes the following process:

1 Periodic meetings and discussions to identify requirements and preferred technical solution(s), alternatives, and options for the implementation of the new flight plan format;

a) In order to facilitate a common understanding of Amendment 1 and its impact to automated and manual systems among the member States and ANSPs, a two-day seminar and workshop is tentatively planned for June 2010.

b) The seminar/workshop will be followed by a two-day meeting of the project for the implementation of the flight plan new format to address revisions or updates to the Strategy for Implementation of Amendment 1, develop conclusions to be forwarded to various subgroups or committees, and determine the schedule for additional TF meetings.

2 The exchange of reports, technical documentation, plans and programming required for ensuring a successful and timely implementation.

3 Planning, technical coordination and implementation of activities by the States, under the coordination of the ICAO Lima and Mexico Offices.

9. Financial aspects

The participating States, as individual administrations, will be responsible for any financial obligation to cover direct and indirect expenditures related to the implementation of this strategy, including those related to the acquisition of the equipment, spare parts, training of technical and operational personnel, lines of communication, and others.

States may establish mechanisms for the implementation of this strategy; for instance, through ICAO technical Cooperation projects, under the supervision of the ICAO Regional Offices.

IMPLEMENTATION OF NEW FLIGHT PLAN FORMAT				
Benefits				
Efficiency	• improved operational efficiency; • enhanced airspace capacity; • improved implementation on a cost-effective basis;			
Safety	• improved safety management			
Strategy Near term (2012)				
ATM Component	**TASK DESCRIPTION**	**START-END**	**RESPON-SIBLE**	**STATUS**
SDM	a) Guidelines on transition to new Flight Plan Format	2009	ICAO	Completed
	b) Develop regional strategy for transition to new Flight Plan Format	March 2010	ICAO	Completed
	c) Identification of stakeholders involved and possible impact by implementation of New Flight Plan Format (FPL/RPL/CPL)	1/10/2009-30/6/2010	States, Territories, Int. Org	Valid
	d) Evaluation of current/future flight plan processing capabilities regarding the New Flight Plan Format.	1/10/2009-30/12/2010	States, Territories, Int. Org	Valid
	e) Conduct trials between systems with NEW flight Plan processing capacity.	18/7/2011-30/6/2012	States, Territories, Int. Org	Valid
	f) Develop of contingency procedures and determination of operational/technical considerations for the transition	1/1/2011-30/6/2011	States, Territories, Int. Org	Valid
	g) Identification of major parties considering FP data flow and definition of transition steps based on: • Systems with capability to process both formats: current and NEW. • Systems to be upgraded/implemented before 2012 and that will be capable to process New Flight Plan Format.	1/1/2011-30/6/2011	States, Territories, Int. Org	Valid
	h) Publication on Transition Actions, Trials and other publication for the users and stakeholders	30/6/2011-30/6/2012	GREPECAS	Valid
	i) Assessment of Transition Actions and make adjustments	18/7/2011-30/6/2012	States, Territories, Int. Org	Valid
	j) Conduct Transition plan	1/4/2012-30/6/2012	States, Territories, Int. Org	Valid
	k) Monitor the transition activities	1/10/2009-15/12/2012	ICAO	Valid
GPIs	GPI/1: flexible use of airspace; GPI/6: air traffic flow management; and GPI/7: dynamic and flexible ATS route management; GPI/9: Situational awareness; GPI/13: aerodrome design and management; GPI/14: runway operations; and GPI/16: decision support and alerting systems; GPI/17: implementation of data link applications; GPI/18: aeronautical Information; GPI/19: meteorological systems; GPI-21: Navigation Systems; GPI-22: Communications Infrastructure and GPI-23: Aeronautical radio spectrum.			

ATTACHMENT D TO APPENDIX E

ACTION PLAN FOR THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT – AMENDMENT 1 TO THE 15th EDITIOIN OF ICAO DOCUMENT 4444 (PANS/ATM)

ACTIVITIES	ACTION BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
Approval of Amendment 1 to the 15th Edition of PANS/ATM – Doc 4444 – (*Procedures for air navigation services – air traffic management)* (ICAO State letter 13/2.1-08/50 of 25 June 2008)	SAM States	Take note of the Amendment	December2008	Completed
Guidelines for the inclusion of the flight plan information as per Amendment 1 to the 15th Edition of PANS/ATM- Doc 4444 (ICAO State letter AN 13/2.1-09/9 of 6 February 2009	SAM States	Take note of the ICAO guidelines	June 2009	Completed
Draft a regional strategy for the implementation of Amendment 1 to the PANS/ATM	RLA/06/901 project	Regional strategy for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM - Doc 4444	October 2009	Completed. The strategy approved by SAM/IG/4 meeting for its adoption in the SAM Region was approved for the CAR/SAM Regions at the meeting of the CNS/ATM Subgroup (March 2010)
Draft a national plan for the implementation of Amendment 1 to the PANS/ATM	SAM States	National plan for the for the implementation of Amendment 1 to the 15th Edition of the ICAO PANS-ATM - Doc 4444	End of April 2010 – Extension to 30 November 2010, for adjustments in accordance with models presented	Plans received from Argentina, Brazil, Chile, Guyana, Peru, Panama, Paraguay, Uruguay and Venezuela.

ACTIVITIES	ACTION BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
Nomination of focal points for the coordination between ICAO and States in the implementation of Amendment 1 to the PANS/ATM	SAM States	SAM States focal points for the coordination between ICAO and States in the implementation of Amendment 1 to the PANS/ATM	7 May 2010	Completed. See Appendix C to this Agenda Item.
Analyze the checklist of systems involved in the flight plan process to evaluate the impact of the implementation of the new flight plan format in the automated systems	SAM/IG meeting	Checklist of systems involved in the flight plan process and its impact on the new flight plan format	SAM/IG/5	See Appendix D to this Agenda Item. Systems affected: flight plan format templates of AMHS terminals and flight plan processors (FDP).
Carry out an analysis on the impact of the implementation of the new flight plan format in the SAM States automated systems	SAM States	Impact of the implementation of the amendment in the automated systems	End of August 2010	Carried out to following States: Argentina, Brazil, Chile, Colombia, Ecuador, Guyana, Panama, Peru, Suriname, Uruguay and Venezuela
Preparation of a SAM seminar/workshop for the implementation of Amendment to the PANS/ATM	ICAO Secretariat	Seminar/Workshop for the Implementation of Amendment 1 to the PANS/ATM	Lima, Peru, 13 to 15 September 2010	Carried out with the participation of 41 delegates from 10 States (Argentina, Bolivia, Brazil, Chile, Panamá, Paraguay, Perú, Suriname, Uruguay and Venezuela; 1 international organization (IATA), 5 providers (Adacel Inc., Atech, Indra, Ineco-Tifsa and Radiocom Inc.)
Hold national meetings between providers and users when implementing Amendment 1 to the PANS/ATM	SAM States	Establishment of a national schedule of meetings for the implementation of Amendment 1 to the PANS/ATM	Necessary national meetings for 2010-2012	The number of national meetings would be determined by the States
Prepare user and service provider personnel on the implementation of Amendment 1 to the PANS/ATM	SAM States	Service provider and user personnel trained on Amendment 1 to the PANS/OPS, under a national training programme	October 2010-November 2012	

ACTIVITIES	ACTION BY	DELIVERABLE	TARGET DATE	REMARKS
1	2	3	4	5
Study the implementation of the transition to the new flight plan format (operation taking under consideration the current and new format)	RLA/06/901 project	Study the implementation of Amendment 1 to the PANS/ATM, during the transition phase	SAM/IG/6	
Implementation of the new flight plan format in accordance with the strategy on the implementation of Amendment 1 to the 15th Edition of the PANS/ATM- Doc 4444	SAM States	Systems involved in the FPL process with capability to operate the new FPL format	End of June 2012	
Implementation of activities permitting systems involved in the FPL to operate with the current and new FPL	SAM States	Systems involved in the FPL process with capability to act upon the current and new flight plan during the transition period	End of 2012	If the new plan is implemented before June 2012, same will be only used on a trial basis (national, intra- and inter-regional), continuing to operate with the current flight plan format. In addition, during this period, pre-operational trials can be carried out (national, intra- and inter-regional)
Keep the Regional Office informed on the progress of activities, as well as on date changes in the action plans	SAM States	Updated information of the action plan	Continuous process until 15/12/2012	
Implementation of operational phase with the current and new flight plan	SAM States	Systems involved in the FPL process operating with the current and new format	1 July 2012 to 15 November 2012	The new FPL format should not become operational before 1 July 2012

ATTACHMENT E TO APPENDIX E

TENTATIVE ANALYSIS OF THE IMPACT OF THE IMPLEMENTATION OF THE NEW FLIGHT PLAN FORMAT (AMENDMENT 1 TO THE 15TH EDITION OF ICAO DOCUMENT 4444) ON AUTOMATED FLIGHT PLAN PROCESSING SYSTEMS

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Flight Plan Form Box 7: Aircraft identification (7 characters maximum)	Alphanumeric characters with no hyphens or symbols will be used for aircraft identification	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Flight Plan Form Box 8: Flight rules and flight types (one or two characters)	a) The classes of flight rules that the pilot intends to apply are more clearly described (I, V, Y, Z). b) The letters for identifying the flight type are maintained, and it is indicated that the flight status must be specified in Box 18 after the STS indicator or when neessary to indicate other reasons after the RMK indicator.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.	a) and b) no change, no effect.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
  Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part A)* **Equipment and Capabilities** **A** GBAS landing system	Letter A is assigned to the GBAS landing system. There was no previous assignment for this letter.	It would affect if the AFTN FPL template does not consider the letter A, because it is not assigned to any function in the current flight plan format.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	It would affect if the FDPS does not consider letter A since this letter is not assigned to any function in the current plan.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since the RDPs currently installed do not have any processing associated to letter A.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 **(**Part A)* **B** LPV (APV with SBAS)	Letter B is assigned to specify an LPV-capable aircraft (APV with SBAS). There was no previous assignment for this letter.	It would affect if the AFTN FPL template does not consider the letter B, because it is not assigned to any function in the current flight plan format.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	It would affect if the FDPS does not consider letter B since this letter is not assigned to any function in the current plan.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since the RDPs currently installed do not have any processing associated to letter B.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 10 (Part A)* **E1, E2 and E3** **E1**: ACARS FMC WPR **E2**: ACARS D-FIS **E3**: ACARS PDC	Letter E had not been assigned before. A numeric value is inserted next to letter E.	It should be affected since the current AFTN FPL template does not contemplate a numerical value in Box 10.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	It would be affected given the new functions allocated to letter E, which does not exist in the current FPL.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter E because it is not assigned to any function in the current flight plan format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part A)* **J1, J2, J3, J4, J5, J6 and J7** **J1**: CPDLC ATN VDL Mode 2 **J2**: CPDLC FANS 1/A HFDL **J3**: CPDLC FANS1/A VDL Mode A **J4**: CPDLC FANS1/A VDL Mode 2 **J5**: CPDLC FANS1/A SATCOM (INMARSAT) **J6**: CPDLC FANS/1/A SATCOM (MTSAT) **J7**: CPDLC FANS 1/A SATCOM (Iridium)	A numerical value is inserted in addition to letter J, and letter J, which originally identified data link, now identifies the various means for CPDLC.	It should be affected since the current AFTN FPL template does not contemplate a numerical value in Box 10.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	It would be affected given the new functions allocated to letter J, which does not exist in the current FPL format.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Could be affected if this system uses letter J of the current flight plan format in its processing.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part A)* **M1, M2 and M3** **M1**: ATC RTF SATCOM (INMARSAT) **M2**: ATC RTF (MTSAT) **M3**: ATC RTF (Iridium)	Letter M is associated to satellite RTF. A number identifying the satellite system used is inserted next to letter M.	It should be affected since the current AFTN FPL template does not contemplate a numerical value in Box 10.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	It would be affected given the new functions allocated to letter M, which does not exist in the current FPL format.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter M because it is not assigned to any function in the current flight plan format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 10 (Part A)* **P1-P9** Reserved for RCP	Letter P links communication performance requirements. A number is inserted next to letter P to identify the various performance requirements.	It should be affected since the current AFTN FPL template does not contemplate a numerical value in Box 10.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	It would be affected given the new functions allocated to letter P, which does not exist in the current FPL format.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter P because it is not assigned to any function in the current flight plan format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part A)* **R** Approved PBN	Letter R is associated to the approved PBN, and was previously associated to RNP type certification. When letter R is used, PBN values reached are specified in Box 18 after the PBN/ indicator.	Might not be affected since the AFTN FPL template would accept in Box 18 the text associated to letter R of Box 10.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	It would be affected since the PBN values achieved are inserted in Box 18 after the new PBN/ indicator, which is not considered in the current plan.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Could be affected if the RDP system uses letter R of Box 10 as well as the corresponding information of Box 18 in its processing.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 10 (Part A)* **W** Approved RVSM	Letter W is assigned to identify RVSM approval.	Should not be affected because the AFTN FPL template should accept letter W since this letter is assigned to the ATS prescription in the current format.	No change, should not be affected	No change, should not be affected	No change, should not be affected	No change, should not be affected	No change, should not be affected

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 **(**Part A)* **X** Approved MNPS	Letter X is assigned to identify MNPS.	Should not be affected because the AFTN FPL template should accept letter X since this letter is assigned to the ATS prescription in the current format.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should be affected given the new assignment of letter X in Box 10.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter X because it is not assigned to any function in the current flight plan format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 10 (Part A)* **Y** VHF with 8.33Khz separation capability	Letter Y is assigned to identify the capability of the VHF system to operate with a 8.33 Khz separation.	Should not be affected because the AFTN FPL template should accept letter Y since this letter is assigned to the ATS prescription in the current format.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should be affected given the new assignment of letter Y in Box 10.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter Y because it is not assigned to any function in the current flight plan format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part A)* **Z** Other equipment installed on board or other capabilities	In addition to other equipment installed on board, the term for other capabilities is also inserted. Other equipment or capabilities must be specified in the flight plan, in Box 18, after a new DAT/ indicator.	Should not be affected since letter Z is considered in the current flight plan format. Information associated with Box 18 should neither be affected since the AFTN template accepts text in this box.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should not be affected since a new DAT/ indicator is introduced in Box 18 associated to letter Z, but this information is not processed.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Could be affected if the RDP system uses letter Z of Box 10 as well as the corresponding information of Box 18 in its processing.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 10 (Part B)* **E Transponder-Mode S**	Letter E indicates: Transponder Mode S, including aircraft identification, pressure altitude, and extended squitter capability (ADS-B).	Could be affected since letter E is a new letter not contained in the current flight plan for surveilance equipment and capabilities.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since letter E is not contained in the current flight plan format for surveillance equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter E because it does not exist in the current format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part B)* **H Transponder-Mode S**	Letter H indicates Transponder Mode S, including aircraft identification, pressure altitude, and improved surveillance capability.	Could be affected since letter H is a new letter not contained in the current flight plan for surveilance equipment and capabilities.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since letter H is not contained in the current flight plan format for surveillance equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter H because it does not exist in the current format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 10 (Part B)* **I Transponder-Mode S**	Letter I indicates Transponder Mode S, including aircraft identification, but with no pressure altitude capability.	Could be affected since letter I is a letter contained in the current flight plan for surveilance equipment and capabilities, but with another significance.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since letter I is a letter contained in the current flight plan for surveilance equipment and capabilities, but with another significance.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter I of the current format, because it is not assigned to any function in the current flight plan format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part B)* **L Transponder Mode S**	Letter L in the new format indicates Transponder Mode S, pressure altitude, extended squitter (ADS-B) and enhanced surveillance capabilities	Could be affected since letter L is a new letter not contained in the current flight plan for surveilance equipment and capabilities.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since letter L is not contained in the current flight plan format for surveillance equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter L because it does not exist in the current format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 10 (Part B)* **X Transponder Mode S**	Letter X in the new format indicates Transponder Mode S, with no aircraft identification or pressure altitude capability.	Could be affected since letter X is a new letter not contained in the current flight plan for surveilance equipment and capabilities.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since letter X is a letter contained in the current flight plan for surveilance equipment and capabilities, but with another significance.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process letter X of the current format, because it is not assigned to any function in the current flight plan format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part B)* **ADS-B B1 and B2** **B1**: ADS-B with specialised 1090Mhz ADS-B out capability **B2**: ADS-B with specialised 1090Mhz ADS-B out and ADS-B in capability **U1 and U2** **U1**: ADS-B out capability using UAT **U2**: ADS-B out and in capability using UAT **V1 and V2** **V1**: ADS-B out capability using VDL-4 **V2**: ADS B out and in capability using VDL-4	Letters B, U, and V indicate new capabilities for ADS-B depending whether the equipment broadcasts in 1090Mhz, UAT, or VDL 4. Numbers are inserted next to the letters to identify ADS-B out and ADS-B out and in capabilities.	Could be affected since the letters and numbers assigned for ADS-B are new and are not assigned in the current flight plan for surveilance equipment and capabilities.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since the letters and numbers associated to ADS-B are new and are not assigned in the current flight plan for surveillance equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the letters and numbers associated to ADS-B because such letters and numbers do not exist in the current format.	The system and the IHM should not be affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 10 (Part B)* **ADS-C D1 and G1** **D1**: ADS-C with FANS1/A capabilities **G1**: ADS–C with ATN capabilities	D and G are new letters to which a numeric value is added, and indicate ADS-C with FANS1/A capabilities and ADS-C with ATN capabilities.	Could be affected since the letters and numbers assigned for ADS-C are new and are not assigned in the current flight plan for surveilance equipment and capabilities.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since the letters and numbers associated to ADS-C are new and are not assigned in the current flight plan for surveillance equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 10 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 10 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the letters and numbers associated to ADS-C because such letters and numbers do not exist in the current format.	The system should not be directly affected since flight plan display is not dependent upon the content of Box 10. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 18 SUR/ indicator	Additional surveillance applications should be listed in Box 18 after the SUR/ indicator.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should be affected since the information contained in this Box 10 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since the SUR/ indicator is not contained in the current flight plan for surveillance equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the SUR/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

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Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 **STS/ indicator** **ALTRV** **ATFMX** **FFR** **FLTCK**	The reason for special management by ATS, for instance search and rescue mission, as follows: **ALTRV**: for a flight conducted according to an altitude reservation **ATFMX**: for a flight whose exemption from ATFM measures has been approved by the appropriate ATS authorities **FFR**: Fire fighting **FLTCK**: flight check for calibration of navigation aid.	Should not be affected since the STS/ indicator exists. Likewise, should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should not be affected since the information contained in this Box 18 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected in view of new assignments for the STS/ indicator.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since the STS/ indicator is contained in the current flight plan format, but the RDP do not process the STS/ indicator as it is not assigned to any function in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 18 **(**Cont.) **STS/ indicator** **HAZMAT** **HEAD** **HOSP**	**HAZMAT**: for a flight carrying hazardous material **HEAD**: a flight with Head of State status **HOSP**: for a medical flight declared by the medical authorities.	Should not be affected since the STS/ indicator exists. Likewise, should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should not be affected since the information contained in this Box 18 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected in view of new assignments for the STS/ indicator.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since the STS/ indicator is contained in the current flight plan format, but the RDP do not process the STS/ indicator as it is not assigned to any function in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 (Cont.) **STS/ indicator HUM MARSA MEDEVAC NONRVSM**	**HUM**: for a flight conducting a humanitarian mission. **MARSA**: for a flight for which a military entity assumes the responsibility for its separation from military aircraft **MEDEVAC**: for a medical emergency evacuation that is critical to save lives. **NONRVSM**: For a flight that has no RVSM capability and intends to operate in RVSM airspace.	Should not be affected since the STS/ indicator exists. Likewise, should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should not be affected since the information contained in this Box 18 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected in view of new assignments for the STS/ indicator.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since the STS/ indicator is contained in the current flight plan format, but the RDP do not process the STS/ indicator as it is not assigned to any function in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 18 (Cont.) **STS/ indicator SAR STATE**	**SAR**: for a flight conducting a search and rescue mission **STATE**: for a flight performing military customs or police services.	Should not be affected since the STS/ indicator exists. Likewise, should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should not be affected since the information contained in this Box 18 does not appear in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected in view of new assignments for the STS/ indicator.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since the STS/ indicator is contained in the current flight plan format, but the RDP do not process the STS/ indicator as it is not assigned to any function in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 **PBN/ indicator** **RNAV specification** **A1**: RNAV10 (RNP10) **B1**: RNAV5 All of the allowed sensors **B2**: RNAV5 GNSS **B3**: RNAV5 DME/DME **B4**: RNAV5 VOR/DME **B5**: RNAV5 INS or IRS **B6**: RNAV5 LORAN C	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should be affected since the information contained in this Box 18 appears in the format contemplated for RPLs in Box Q (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should be affected since the PBN/ indicator is not contained in the current flight plan for navigation equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the PBN/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 (Cont.) **PBN/ indicator RNAV specification** **C1:** RNAV2 with all sensors **C2:** RNAV2 with GNSS **C3:** RNAV2 DME/DME **C4:** RNAV2 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should be affected since the information contained in this Box 18 appears in the format contemplated for RPLs in Box Q (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should be affected since the PBN/ indicator is not contained in the current flight plan for navigation equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the PBN/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 **(**Cont.) **PBN/ indicator RNAV specification** **D1:** RNAV 1 with all sensors **D2:** RNAV1 GNSS **D3:** RNAV1 DME/DME **D4:** RNAV1 DME/DME/IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should be affected since the information contained in this Box 18 appears in the format contemplated for RPLs in Box Q (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should be affected since the PBN/ indicator is not contained in the current flight plan for navigation equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the PBN/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 18 **(**Cont.) **PBN/ indicator RNP specification** **L1**: RNP-4 **O1**: Basic RNP with all allowed sensors **O2**: Basic RNPGNSS **O3**: Basic RNP 1 DME DME **O4**: Basic RNP1 DME/DME /IRU	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should be affected since the information contained in this Box 18 appears in the format contemplated for RPLs in Box Q (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should be affected since the PBN/ indicator is not contained in the current flight plan for navigation equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the PBN/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 **(**Cont.) **PBN/ indicator RNP specification** **S1:** RNP APPCH **S2:** RNP APPCH with Baro VNAV	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should be affected since the information contained in this Box 18 appears in the format contemplated for RPLs in Box Q (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should be affected since the PBN/ indicator is not contained in the current flight plan for navigation equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the PBN/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 18 **(**Cont.) **PBN/ indicator RNP specification** **T1**: RNP AR APPCH with RF **T2**: RNP AR APPCH without RF	PBN/ Indication of RNAV and RNP capability. The number of descriptors listed in column 1 that apply to the flight is indicated, using a maximum of eight entries, that is, a total of no more than 16 characters.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should be affected since the information contained in this Box 18 appears in the format contemplated for RPLs in Box Q (Doc 4444, Appendix 2, Section 6, Chapter 16).	Should be affected since the PBN/ indicator is not contained in the current flight plan for navigation equipment and capabilities.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the PBN/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 DLE/ indicator	**DLE** New indicator related to en-route delay or holding. En-route significant points where delay is expected to occur are to be inserted, followed by the duration of the delay, using four digits for time, in hours and minutes.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should not be affected since the information contained in this Box 18 does not appears in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since the DLE/ indicator does not appear in the current flight plan.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the DLE/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.
Box 18 ORGN/ indicator	The 8-letter AFTN address of the originator and other details of the appropriate contact, when the flight plan originator cannot be easily identified as stipulated by the appropriate authority.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should not be affected since the information contained in this Box 18 does not appears in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since the ORGN/ indicator does not appear in the current flight plan.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the ORGN/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 TALT/ indicator	Four-letter ICAO indicators for alternate take-off aerodromes as specified in Location Indicators, Doc 7910 or the name of the alternate en-route aerodromes if no indicator is assigned. For aerodromes not listed in the relevant aeronautical information publication, indicate the location in LAT/LONG or bearing and distance with respect to the closest significant point as described in DEP/.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Should not be affected since the information contained in this Box 18 does not appears in the format contemplated for RPLs (Doc 4444, Appendix 2, Section 6, Chapter 16).	Could be affected since the TALT/ indicator does not appear in the current flight plan.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the TALT/ indicator because it is not contemplated in the current flight plan format.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

Flight Plan Amendment Message Types	Change Required	AFTN System	Repetitive Flight Plan System	Flight Data Processing System (FDP)	Flight Progress Strip Printing	Radar Data Processing System (RDP)	Flight Plan Display (IHM)
1	2	3	4	5	6	7	8
Box 18 DOF/ indicator	Date of departure of the flight in a six-digit format (YYMMDD), where AA is the year, MM the month, and DD is the day.	Should not be affected by this new indicator since Box 18 of the AFTN FPL template contains free text.	Non applicable	Should be affected since the DOF/ indicator does not appear in the current flight plan and the current reference is only the time data in Box 13.	Should not be directly affected because this system does not use this information contained in Box 18 in the printing process. If the flight plan is not printed, it would be because the FDP is affected by the change in Box 18 and, consequently, is not sending information to the printer.	Should not be affected since RDPs do not process the DOF/ indicator.	Should not be directly affected since this system does not use this information of Box 18 for flight plan display. If a flight plan is not being displayed, it would be because the FDP is affected by this change.

* Part A - Radiocommunication and navigation and approach aid equipment and capabilities
Part B - Surveillance equipment and capabilities

MINISTERIO DE DEFENSA
COMANDO DE LA AERONAUTICA
DEPARTAMENTO DE CONTROL DEL ESPACIO AÉREO

PLAN DE ACCIÓN

IMPLANTACIÓN DEL NUEVO FORMATO DE PLAN DE VUELO CON LA APLICACIÓN DE LA ENMIENDA 1 A LA 15ª EDICIÓN DEL PANS-ATM DE LA OACI (DOC 4444)

MINISTERIO DE DEFENSA
COMANDO DE LA AERONAUTICA
DEPARTAMENTO DE CONTROL DEL ESPACIO AÉREO

PROVIDENCIA ADMINISTRATIVA DECEA Nº 122/DGCEA, DE 24 DE AGOSTO DE 2010.

Aprueba el Plan de Acción que visa implantar la aplicación del nuevo formato de plan de vuelo de acuerdo con la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444), con entrada en vigencia el 15 Nov 2012, y da otras providencias.

EL DIRECTOR-GENERAL DEL DEPARTAMENTO DE CONTROL DEL ESPACIO AÉREO, en uso de las atribuciones que le confiere el art. 4º, incisos III y IV, combinado con el art. 10, inciso IV, todos del Reglamento del Departamento de Control del Espacio Aéreo (ROCA 20-7), aprobado por la Providencia Administrativa en el 369/GC3, de 9 de junio de 2010, resuelve:

Art. 1º Aprobar el Plan de Acción para implantar la aplicación del nuevo formato de plan de vuelo en el SISCEAB, de acuerdo con la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444), con entrada en vigencia el 15 Nov 2012.

Art. 2º Encargar el SDTE de coordinar, junto a los demás Órganos y sectores pertinentes subordinados al DECEA, las acciones necesarias a la aplicación del nuevo formato de plan de vuelo, contenidas en el Módulo 3 (Sistemas Automatizados).

Art. 3º Encargar el SDOP de coordinar, junto a los demás Órganos y sectores pertinentes subordinados al DECEA, las acciones necesarias a la aplicación del nuevo formato de plan de vuelo, contenidas en el Módulo 1 (Legislación) y en el Módulo 4 (Instrucción y Entrenamiento).

Art. 4º Encargar la ASEGCEA de coordinar, junto a los demás Órganos y sectores pertinentes subordinados al DECEA, las acciones necesarias a la aplicación del nuevo formato de plan de vuelo, contenidas en el Módulo 2 (Evaluación de Seguridad Operacional).

Art. 5º Esta Providencia Administrativa entra en vigencia en la fecha de su publicación.

(a) Ten Brig Ar RAMON BORGES CARDOSO
Director-General del DECEA

(Publicado en el Boletín Interno Ostensivo nel 161, de 25 de agosto de 2010)

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PREFACIO

El Plan de Vuelo es el documento específico que contiene informaciones relacionadas con un vuelo planificado de una aeronave o con parte de él que son proporcionadas a los órganos que proveen servicios de tránsito aéreo.

La Enmienda 1 a la 15ª Edición del PANS-ATM (Doc 4444), con entrada en vigencia el 15 de noviembre de 2012, tiene por objetivo actualizar el formulario de plan de vuelo establecido por la OACI, posibilitando declarar los modernos recursos aviónicos disponibles a bordo y atender a los requisitos de los sistemas automatizados de gestión del tránsito aéreo.

El material de esta Enmienda ha sido desarrollado por el Grupo de Estudios sobre Plan de Vuelo (FPLSG) establecido por la OACI, con la finalidad de permitir mejor aprovechamiento de las avanzadas capacidades de aviónica a bordo de las aeronaves más modernas y atender a los requisitos desarrollados de nuevos sistemas automatizados de gestión de tránsito aéreo.

El nuevo plan de vuelo aborda funcionalidades y tecnologías de la navegación aérea, tales como el GNSS, la RNAV, la PBN, los enlaces de datos (datalinks), la ADS-B y la ADS-C, siendo esas alteraciones reflejadas de modo más substancial en las alteraciones del contenido de los ítems 10 y 18 del formulario de plan de vuelo.

Tales datos deberán ser considerados por los sistemas de gestión del tránsito aéreo en el sentido de poner a disposición del controlador de tránsito aéreo las informaciones necesarias para la planificación del tránsito aéreo, bien como posibilitar la emisión de alertas siempre que haya modificación del escenario con relación a los datos declarados y que ocasionen impacto en las acciones planificadas de control.

El presente Plan de Acción establece una serie de medidas que deben desarrollarse por Órganos Regionales y sectores subordinados al DECEA, definiendo objetivos, criterios, métodos, prioridades y responsabilidades referentes a las acciones necesarias para implantar el nuevo formato de plan de vuelo en el SISCEAB, conforme los requisitos preconizados, de forma a asegurar una transición coordinada para la aplicación del contenido de la referida Enmienda.

1 DISPOSICIONES PRELIMINARES

1.1 FINALIDAD

Este Plan tiene por objeto establecer directrices para implantar la aplicación del nuevo formato de plan de vuelo en el SISCEAB, conforme requisitos preconizados en la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444) con entrada en vigencia el 15 de noviembre de 2012.

1.2 CONCEPTUACIÓN

AREA DE CONTROL – Espacio aéreo controlado que se extiende hacia arriba a partir de un límite especificado sobre el terreno. El concepto de Área de Control abarca, también, las aerovías y TMA.

CENTRO DE CONTROL DE ÁREA – Órgano establecido para proveer servicio de control de tránsito aéreo a los vuelos controlados en las áreas bajo su jurisdicción.

PLAN DE VUELO – Informaciones específicas, relacionadas con un vuelo planificado o con parte de un vuelo de una aeronave, proporcionadas a los órganos que proveen servicios de tránsito aéreo.

PLAN DE VUELO PRESENTADO – Plan de Vuelo tal como presentado por el piloto, o su representante, al órgano de servicio de tránsito aéreo, sin cualquier modificación posterior.

PLAN DE VUELO EN VIGOR – Plan de Vuelo que abarca las modificaciones, caso existan, resultantes de autorizaciones posteriores.

PROYECTO C3 – Proyecto establecido por el Subgrupo CNS/ATM del GREPECAS, dentro del Programa de Automatización y Comprensión Situacional ATM, con la finalidad de implementar el nuevo formato de plan de vuelo en los Estados de las Regiones CAR/SAM en conformidad con la estrategia aprobada en la reunión CNS/ATM/SG/1.

1.3 ABREVIATURAS Y SÍMBOLOS

ACC	Centro de Control de Área
ADS-B	Vigilancia Dependiente Automática por Radiodifusión (*Broadcast*)
ADS-C	Vigilancia Dependiente Automática por Contrato
AIS	Servicio de Información Aeronáutica
APP	Control de Aproximación
ASEGCEA	Asesoría de Seguridad Operacional en el Control del Espacio Aéreo
ATC	Control de Tránsito Aéreo

ATCO	Controlador de Tránsito Aéreo
ATM	Gestión del Tránsito Aéreo
ATS	Servicios de Tránsito Aéreo
CHG	[Mensaje de] Modificación
CINDACTA	Centro Integrado de Defensa Aérea y Control del Tránsito Aéreo
CISCEA	Comisión de Implantación do Sistema de Control del Espacio Aéreo
CNL	[Mensaje de] Cancelación
DECEA	Departamento de Control del Espacio Aéreo
DEP	[Mensaje de] Partida
DLA	[Mensaje de] Retraso
DLE	[Mensaje de] Retraso en ruta
DOF	Día del Vuelo (*Day of Flight*)
EOBT	Hora prevista de fuera calzos
FIR	Región de Información de Vuelo
FITS	Sistema de Seguimiento de la Aplicación de los Planes de Vuelo (*Flight Plan Implementation Tracking System)*
FPL	[Mensaje de] Plan de Vuelo [Presentado]
GNSS	Sistema Global de Navegación por Satélites
GREPECAS	Grupo Regional de Planificación y Ejecución CAR/SAM
ICA	Instrucción del Comando de la Aeronáutica
IHM	Interfaz Hombre-máquina
OACI	Organización de Aviación Civil Internacional
PANS	Procedimientos para los Servicios de Navegación Aérea
PBN	Navegación Basada en Performance
PER	Performance (de la aeronave)
RMK	Observaciones (*Remarks*)
RNAV	Navegación de Área
RNP	Performance de Navegación Requerida
RVSM	Separación Vertical Mínima Reducida
SAGITARIO	Sistema Avanzado de Gestión de Informaciones de Tránsito Aéreo e

	Informes de Interés Operacional
SDOP	Subdepartamento de Operaciones del DECEA
SDTE	Subdepartamento Técnico del DECEA
SISCEAB	Sistema de Control del Espacio Aéreo Brasileño
SGSO	Sistema de Gestión de la Seguridad Operacional
SGTC	Sistema de Gestión de Torre de Control
SRPV	Servicio Regional de Protección al Vuelo
STPV	Sistema de Tratamiento de Plan de Vuelo
STS	*Status* (de tratamiento especial de un Vuelo)
STVD	Sistema de Tratamiento y Visualización de Datos
TALT	Aeródromo alternativo de despegue
TATIC	*Total Air Traffic Information Control*
Waypoint	Punto de notificación o fijo en rutas o procedimientos basados en sistemas de navegación de área
X-4000	Sistema automatizado de control de tránsito aéreo

1.4 ÁMBITO

Este Plan de Acción, de observancia obligatoria, se aplica a todos los órganos y sectores del SISCEAB involucrados con la recepción, la transmisión, el tratamiento y la visualización de las informaciones a disposición en un plan de vuelo o que utilicen sistemas que procesan esas informaciones como apoyo a la gestión de la navegación aérea nacional, en aquello que les corresponda.

2 ANÁLISIS DE LA SITUACIÓN

2.1 ANTECEDENTES

La actualización del formato del modelo de plan de vuelo de la OACI, en línea con el contenido de la Enmienda 1 a la 15ª Edición del PANS-ATM (Doc 4444), aprobada el 27 de mayo de 2008, para aplicación el 15 de noviembre de 2012, ha sido comunicada formalmente a los Estados por medio de la carta AN13/2.1-08/50 del 25 de junio de 2008.

Este material ha sido desarrollado por el Grupo de Estudios sobre Plan de Vuelo (FPLSG) establecido por la OACI, con la finalidad de permitir mejor aprovechamiento de las avanzadas capacidades de aviónica a bordo de las aeronaves más modernas y atender a los requisitos desarrollados de nuevos sistemas automatizados de gestión del tránsito aéreo.

En vista de los diversos sistemas automatizados que participan en la recepción, transmisión, procesamiento y visualización de las informaciones contenidas en un plan de vuelo y la naturaleza de las modificaciones previstas con la entrada en vigencia de la referida Enmienda, se hace necesario elaborar una planificación de acciones que deberán ser iniciadas de inmediato, visando la actualización de los sistemas y la capacitación de los recursos humanos involucrados en todo el proceso de modo que, efectivamente, el nuevo formato de plan de vuelo esté implantado en el espacio aéreo brasileño el 15 de noviembre de 2012.

En este sentido, la reunión del GREPECAS/15 ha formulado la Conclusión 15/35 – Implementación del nuevo modelo de plan de vuelo de la OACI, con la finalidad de elaborar una estrategia regional para la transición al nuevo modelo de plan de vuelo en las Regiones CAR/SAM. En consecuencia de esa conclusión y considerando las directrices emanadas por la OACI contenidas en la Comunicación a los Estados AN13/2.1-09/9 del 6 de febrero de 2009, se ha elaborado una estrategia para la aplicación, en la Región SAM, de la Enmienda 1 a la 15ª Edición del PANS-ATM (Doc 4444), que ha sido revisada y aprobada durante la reunión SAM/IG/4.

Este mismo material ha sido revisado, con pequeñas alteraciones, y aprobado en la reunión CNS/ATM/SG, en marzo de 2010, como la "Estrategia para Implementación de la Enmienda 1 a la 15ª Edición del PANS-ATM (Doc 4444) de la OACI en las regiones CAR/SAM". Este documento prevé la elaboración por cada Estado de un plan de acción para la implementación del contenido de la referida Enmienda.

2.2 ESCENARIO ACTUAL

El Plan de Vuelo es el documento específico que contiene informaciones relacionadas con un vuelo planificado de una aeronave o con parte de él que son proporcionadas a los órganos que proveen servicios de tránsito aéreo.

En Brasil, la instrucción del Comando de la Aeronáutica que tiene por finalidad reglamentar el uso del Plan de Vuelo es la ICA 100-11, en complemento al dispuesto en las Reglas del Aire y Servicios de Tránsito Aéreo (ICA 100-12).

Cancelaciones, modificaciones y retrasos, relativos a un Plan de Vuelo presentado, deben ser notificados en cualquier Sala AIS de aeródromo, no necesariamente la del aeródromo de partida, por medio de mensajes ATS.

Las reglas relativas al contenido, al formato y a la aplicación de los mensajes ATS, bien como los procedimientos pertinentes para la vehiculación de dichos mensajes son establecidos en la Instrucción del Comando de la Aeronáutica con el título de Mensajes ATS (ICA 100-15).

Esos mensajes son tratados por diversos sistemas automatizados que participan en la recepción, en la transmisión, en el procesamiento y en la visualización de las informaciones contenidas en un plan de vuelo y de los mensajes relacionados con la actualización de esas informaciones, o por otros sistemas que procesan esas informaciones como apoyo a la gestión de la navegación aérea y a la defensa del espacio aéreo nacional.

Los tipos estandarizados de mensajes, establecidos para el intercambio de datos ATS, y los correspondientes designadores son los siguientes:

CATEGORÍA DEL MENSAJE		TIPO DE MENSAJE	DESIGNADOR
Emergencia		Alerta	ALR
		Fallo de radiocomunicaciones	RCF
Movimiento y Control	Plan de Vuelo Presentado y Actualizaciones Correspondientes	Plan de vuelo presentado	FPL
		Modificación	CHG
		Cancelación	CNL
		Retraso	DLA
		Partida	DEP
		Llegada	ARR
	Coordinación	Plan de vuelo en vigencia	CPL
		Estimado	EST
		Coordinación	CDN
		Aceptación	ACP
		Confirmación lógica	LAM
	Suplementar	Solicitud de plan de vuelo	RQP
		Solicitud de plan de vuelo suplementar	RQS
		Plan de vuelo suplementar	SPL

2.3 ESCENARIO DESEADO

El escenario deseado es la implantación de la Enmienda 1 a la 15ª Edición del PANS-ATM (Doc 4444) de la OACI, contemplando su aplicación de forma integral el 15 de noviembre de 2012, con la actualización del contenido de las legislaciones nacionales, en especial el de las ICA 100-11 y ICA 100-15, y de los diversos sistemas automatizados que participan en la recepción, transmisión, procesamiento y visualización de las informaciones contenidas en un plan de vuelo y de los mensajes relacionados con la actualización de las informaciones contenidas en el mismo, bien como la adecuación de los demás sistemas que procesan estas informaciones como apoyo a la gestión de la navegación aérea y a la defensa del espacio aéreo nacional.

Esa Enmienda contiene alteraciones en el tamaño y en el contenido de ciertos ítems del formulario de plan de vuelo (principalmente en los campos 10, 15 y 18) y que:

a) alteran la manera como son informados equipamientos y capacidades de la aeronave, incluyendo más detalles sobre esos ítems;
b) proporcionan medios adicionales para describir *waypoints* en ruta (específicamente, azimut y distancia de otros puntos que no son auxilios a la navegación);

c) introducen conceptos nuevos, tales como el aeródromo alternativo de despegue (TALT) y la especificación de retraso en ruta (DLE); y
d) permiten la especificación del día del vuelo declarado en el ítem 18 (DOF) para los casos de presentación del referido plan con más de 24 horas y hasta 120 horas de antelación al EOBT.

Otro aspecto se refiere a distintos mensajes ATS de movimiento y control, utilizadas como medio de intercambio de datos de plan de vuelo entre los órganos de control de tránsito aéreo, que sufrirán alteraciones de contenido.

Las principales modificaciones producidas por la aplicación de la Enmienda 1 serán listadas a seguir y afectan los sistemas automatizados de control de tránsito aéreo y, de modo particular, exigirán alteraciones en el sistema de tratamiento de plan de vuelo (STPV) y de interfaces hombre-máquina (IHM).

Las modificaciones de los requisitos de sistema para posibilitar la aplicación de esa Enmienda deberán, además, llevar en consideración los riesgos inmediatos asociados a la perdida de datos, a la interpretación errónea de datos y al rechazo de planes de vuelo presentados, bien como la previsión de una fase de transición donde se convivirá con la vehiculación del formato actual y del formato nuevo de plan de vuelo.

2.3.1 PRESENTACIÓN DEL PLAN DE VUELO

La Enmienda 1 altera el plazo para presentación de un plan de vuelo, permitiendo hacerlo con hasta 120 horas de antelación a la EOBT. Esa alteración requiere que los sistemas de tratamiento de datos de plan de vuelo sean adaptados para posibilitar el almacenamiento de esa nueva condición del plan, además de permitir el acceso a sus datos para fines de actualizaciones decurrentes de mensajes ATS (CHG, DLA y CNL).

La fecha de la realización del vuelo deberá ser declarada después del indicador DOF a ser especificado en el Ítem 18 del FPL para los planes presentados con más de 24 horas de antelación de la EOBT.

2.3.2 ÍTEM 7 DEL FPL – IDENTIFICACIÓN DE LA AERONAVE

La Enmienda 1 establece que el Ítem 7 del FPL debe permitir la inserción de hasta 7 caracteres alfanuméricos, sin posibilidad de empleo de caracteres especiales (guión o símbolos). Tomando en cuenta que algunos sistemas de bordo componen mensajes de enlace descendente (*downlink*) incluyendo en ese campo caracteres especiales (guión), el sistema de tierra deberá ser capaz de desconsiderar tal información para fines de asociación con los datos de plan de vuelo almacenados.

2.3.3 ÍTEM 8 DEL FPL – REGLAS DE VUELO Y TIPO DE VUELO

El nuevo formato posibilita la inclusión de una o más alteraciones de regla de vuelo a lo largo de la trayectoria definida en el plan, por medio de la especificación de los caracteres “Y” o “Z” para el primer tramo del vuelo. Con esa opción, los respectivos puntos de alteración de regla deben ser definidos en el ítem 15 – Ruta, los cuales deben estar contenidos en la ruta declarada.

Para un tipo de vuelo en situación que requiera un tratamiento específico de los órganos ATS, será utilizado el indicador STS correspondiente a ser declarado en el ítem 18 del FPL o el indicador RMK para los casos no especificados en la Enmienda.

2.3.4 ÍTEM 10 DEL FPL – EQUIPAMIENTOS – COM/NAV

Este ítem del FPL posibilita la declaración de los equipamientos disponibles y

de su capacidad de utilización, conforme el listado incluso en la Enmienda.

En la declaración de los equipamientos COM/NAV en el FPL, deben ser utilizados uno o dos caracteres, siendo que el primer de los caracteres será alfabético y el segundo (cuando exista) será numérico. Para que se atienda esa funcionalidad, será necesario considerar la posibilidad de todas las combinaciones de equipamientos, lo que requiere que el tamaño del Ítem 10 del FPL sea ampliado para posibilitar la declaración de las combinaciones posibles.

2.3.5 ÍTEM 13 DEL FPL – AERÓDROMO DE DEP Y HORA

Para los casos en que la aeronave no despegue de un aeródromo, no habiendo indicador de localidad, el piloto declarará ZZZZ en el Ítem 13 del FPL y especificará en el Ítem 18, después del indicador DEP, el primer punto de la ruta o auxilio radio.

2.3.6 ÍTEM 15 DEL FPL – RUTA

Posibilitará que los puntos de una ruta puedan ser definidos, también, utilizándose como referencia una marcación magnética y una distancia en relación con un punto significativo definido por coordinadas geográficas.

También pasa a ser requisito, conforme modificación del Ítem 8, mencionada anteriormente, el tratamiento de la inserción alternada de las letras Y o Z en este Ítem 15 (Ruta), para permitir la especificación de más de un punto de alteración de reglas de vuelo, siendo que el sistema deberá interpretar los puntos en los cuales habrá alteración de reglas de vuelo.

2.3.7 ÍTEM 18 DEL FPL – OTROS DATOS

Los siguientes indicadores deberán ser considerados válidos para declaración en el Ítem 18 del FPL: STS/, PBN/, NAV/, COM/, DAT/, SUR/, DEP/, DEST/, DOF/, REG/, EET/, SEL/, TYP/, CODE/, DLE/, OPR/, ORGN/, PER/, ALTN/, RALT/, TALT/, RIF/ y RMK/.

La secuencia presentada más arriba deberá ser obedecida a la hora de rellenarse el Ítem 18 del FPL, siendo que la utilización de indicador no especificado por la Enmienda puede generar un rechazo, un procesamiento incorrecto o una pérdida de la información.

El carácter especial “guión” no podrá ser utilizado en el Ítem 18 y el empleo de barra (/) solamente será permitido después de cada indicador.

2.3.7.1 INDICADOR STS

Las siguientes razones para tratamiento especial por un órgano ATS podrán ser declaradas después del indicador STS; otras razones deberán ser especificadas con el uso del indicador RMK:

a) ALTRV: vuelo operado en conformidad con una reserva de altitud;
b) ATFMX: vuelo autorizado con exención de medidas ATFM por autoridad ATS competente;
c) FFR: combate a incendio;
d) FLTCK: inspección en vuelo;
e) HAZMAT: vuelo transportando material peligroso;
f) HEAD: vuelo con (“status”) Jefe de Estado;
g) HOSP: vuelo médico declarado por autoridades médicas;

h) HUM: vuelo realizando misión humanitaria;
i) MARSA: vuelo por el cual un órgano militar asume responsabilidad por la separación de aeronave militar;
j) MEDEVAC: evacuación médica de emergencia con riesgo de vida;
k) NONRVSM: vuelo no aprobado para RVSM con intención de operar en espacio aéreo RVSM;
l) SAR: vuelo que participa en misión de búsqueda y salvamento; y
m) STATE: vuelo que participa en servicios militares, aduaneros o policiales.

2.3.7.2 INDICADOR PBN

Las siguientes capacidades RNAV y RNP podrán ser declaradas después del Indicador PBN:

a)	A1	RNAV 10 (RNP 10)
b)	B1	RNAV 5 todos los sensores permitidos
c)	B2	RNAV 5 GNSS
d)	B3	RNAV 5 DME/DME
e)	B4	RNAV 5 VOR/DME
f)	B5	RNAV 5 INS o IRS
g)	B6	RNAV 5 LORANC
h)	C1	RNAV 2 todos los sensores permitidos
i)	C2	RNAV 2 GNSS
j)	C3	RNAV 2 DME/DME
k)	C4	RNAV 2 DME/DME/IRU
l)	D1	RNAV 1 todos los sensores permitidos
m)	D2	RNAV 1 GNSS
n)	D3	RNAV 1 DME/DME
o)	D4	RNAV 1 DME/DME/IRU
p)	L1	RNP 4
q)	O1	Básico RNP 1 todos los sensores permitidos
r)	O2	Básico RNP 1 GNSS
s)	O3	Básico RNP 1 DME/DME
t)	O4	Básico RNP 1 DME/DME/IRU
u)	S1	RNP APCH
v)	S2	RNP APCH con BARO-VNAV
w)	T1	RNP AR APCH con RF (autorización especial requerida)
x)	T2	RNP AR APCH sin RF (autorización especial requerida)

2.3.7.3 INDICADOR NAV

Otros datos relativos a equipamiento de navegación, además de los especificados con el indicador PBN/, conforme requerido por la autoridad ATS competente, podrán ser declarados después de NAV/, como, por ejemplo, los recursos de aumentación del GNSS, con utilización de espacio separando dos o más métodos de aumentación.

2.3.7.4 INDICADOR COM

Las aplicaciones o capacidades de comunicación no especificadas en el Ítem 10 debem ser declaradas después del indicador COM.

2.3.7.5 INDICADOR DAT

Las aplicaciones o capacidades de datos no especificadas en el Ítem 10 deben ser declaradas después del indicador DAT.

2.3.7.6 INDICADOR SUR

Las aplicaciones o capacidades de vigilancia no especificadas en el Ítem 10 deben ser declaradas después del indicador SUR.

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2.3.7.7 INDICADOR DEP

Para los aeródromos de despegue no listados en Publicación de Información Aeronáutica, debe ser declarada la localización del despegue después del indicador DEP, de acuerdo con los casos establecidos en la Enmienda 1.

2.3.7.8 INDICADOR DEST

Para los aeródromos de destino no listados en Publicación de Información Aeronáutica, debe ser declarada la localización del despegue después del indicador DEST, de acuerdo con los casos establecidos en la Enmienda 1.

2.3.7.9 INDICADOR DOF

Para la puesta en funcionamiento del tratamiento de planes de vuelo presentados con más de 24 horas y hasta 120 horas de antelación, la fecha (YYMMDD) de realización del vuelo debe ser declarada después del indicador DOF, donde YY, MM y DD se refieren, respectivamente, al año, al mes y al día.

2.3.7.10 INDICADOR DLE

Para los casos de retraso en ruta o esperas, deberán ser inseridos los puntos significantes en la ruta donde se planea que ocurra el retraso, seguido por la duración de ese retraso en el formato de horas y minutos (hhmm).

2.3.7.11 INDICADOR ORGN

Para la inserción del direccionamiento AFTN de 8 letras del originador del FPL u otros detalles de contacto apropiados, en los casos donde el originador del plan de vuelo no puede ser fácilmente identificado, de acuerdo con lo establecido por la autoridad ATS competente.

2.3.7.12 INDICADOR PER

Para la inserción de datos de performance de la aeronave, con el uso de una sola letra, conforme especificado en los Procedimientos para los Servicios de Navegación Aérea – Operación de Aeronaves (PANS-OPS, Doc 8168), Volumen I – Procedimientos de Vuelo, si estipulado por la autoridad ATS competente.

2.3.7.13 INDICADOR TALT

Para la inserción del indicador de 4 letras o del nombre del aeródromo, caso no exista indicador publicado, para el aeródromo alternativo de despegue en el cual la aeronave tenga condiciones de aterrizar, si, por razones técnicas u operacionales, ocurra la necesidad de llevarse a cabo un poso no previsto (de emergencia) inmediatamente tras el despegue y siendo ello impracticable en el propio aeródromo de despegue.

2.3.8 COMPOSICIÓN DE MENSAJES ATS

El Ítem 18 pasa a componer los siguientes mensajes ATS: DLA, CNL, CHG, DEP, RQP y RQS. La EOBT también debe rellenarse en el Ítem 13 en los mensajes ARR, CHG, CNL y RQS.

2.3.9 COMUNICACIÓN ENTRE SISTEMAS

La aplicación de la Enmienda 1 en los sistemas ATC automatizados genera la necesidad de procederse a una revisión de las especificaciones de las aplicaciones y protocolos para intercambio de datos entre los sistemas, a saber: Protocolo AIDC (Comunicaciones de Datos entre Instalaciones de Servicios de Tránsito Aéreo), Protocolo OLDI (Intercambio de Datos en Línea) y Formato ADEXP (Presentación del Intercambio de Datos de Servicios de Tránsito Aéreo).

2.3.10 AMHS (SISTEMA DE MANEJO DE MENSAJES ATS)

El sistema de tratamiento de mensajes aeronáuticas, tal como se encuentra implantado, presenta pantallas y formatos estandarizados, inclusive cuanto al tamaño de los campos de cada ítem. Por lo tanto, deben ser evaluadas las alteraciones correspondientes a las modificaciones decurrentes de la Enmienda 1. Del mismo modo, considerándose la hipótesis de la continuidad de operación de la AFTN, se deberá proceder a una evaluación de los impactos en esa red.

2.3.11 SGTC Y TATIC

Los sistemas actualmente existentes en torre de control, en especial el SGTC y el TATIC, tal como se encuentran implantados, presentan pantallas con formatos estandarizados, inclusive cuanto al tamaño de los campos para presentación e inserción de datos referentes a ítems extraídos de algunos mensajes ATS. Por lo tanto, deben ser efectuadas las alteraciones correspondientes a las modificaciones decurrentes de la Enmienda 1.

2.4 ESCENARIO DE TRANSICIÓN

Las directrices emanadas por la OACI, contenidas en la carta a los Estados AN13/2.1-09/9, de 6 de febrero de 2009, establecen orientaciones en apoyo a los esfuerzos de coordinación global durante el período de transición, de modo que se logre una transición coordinada y exitosa hasta la fecha de aplicación de la Enmienda 1 el 15 de noviembre de 2012.

Las acciones adoptadas en esta fase de transición, conforme consta en la estrategia aprobada por los Estados para las Regiones CAR/SAM, deben:

a) seguir las orientaciones del GREPECAS;
b) observar las directrices de la OACI presentadas en la Comunicación a los Estados AN13/2.1-09/9;
c) actuar junto al coordinador de la implantación;
d) ejecutar las actividades previstas en los planes de acción para mitigar los impactos técnicos y operacionales; y
e) reconocer que las ventajas para los usuarios del espacio aéreo solamente serán plenamente logradas con la implantación conjunta de las modificaciones en todos los Estados.

En las Regiones CAR/SAM, el período de transición para cuando los proveedores de servicio de navegación aérea deben tener la capacidad de procesar los dos formatos de plan de vuelo, ACTUAL y NUEVO, ha sido establecido como siendo del 1 de julio al 15 de noviembre de 2012.

El período del 1er de enero al 31 de marzo de 2012 debe ser utilizado para la implantación de software y pruebas internas en el formato NUEVO del plan de vuelo. El

período del 1er de abril al 30 de junio de 2012 debe ser dedicado a las pruebas externas, con interfaces a otros centros, pruebas de funcionalidades y de la tabla de conversión entre los formatos NUEVO y ACTUAL.

Con el propósito de cumplir este plazo y armonizar la implantación con otras regiones de la OACI, las modificaciones necesarias en los sistemas deben ser completadas hasta el 30 de junio de 2012.

Del mismo modo, los usuarios del espacio aéreo deben hacer gestiones para la adecuación precisa y correcta de sus sistemas de acuerdo con lo preconizado en la Enmienda 1, respetando el período de transición establecido, donde se prevé la convivencia del formato NUEVO y del formato ACTUAL del plan de vuelo.

Para permitir mayor agilidad en las coordinaciones de naturaleza técnica y operacional, cada Estado debe designar una persona que actuará como punto de contacto para las coordinaciones necesarias con la OACI, así como con otros Estados durante la fase de transición en la implantación de las modificaciones para el nuevo formato de plan de vuelo.

En ese sentido, la Oficina Regional SAM de la OACI envió la carta SA224, del 14 de abril de 2010, a todos los Estados de la Región SAM, solicitándoles que enviaran a aquella Oficina el nombre designado como punto de contacto hasta el día 7 de mayo de 2010.

Además de esta acción inmediata, el informe final de la SAM/IG/5 orienta que cada Estado priorice la creación de un comité nacional, compuesto por los proveedores de los servicios de navegación aérea y por usuarios, con el intuito de que ese grupo coordine los trabajos de implantación del nuevo formato del plan de vuelo por medio de reuniones de coordinación.

Para auxiliar en las acciones de coordinación, la sede de la OACI ha elaborado una página (*web site)* llamada de Sistema de Seguimiento de la Aplicación de los Planes de Vuelo (FITS), donde será registrado el estado de implementación en todas las Regiones de Información de Vuelo (FIR), bien como estarán a disposición otras informaciones relacionadas con el tema.

3 ESTRATEGIA DE EJECUCIÓN

3.1 OBJETIVO

El objetivo central de este Plan de Acción se centra en la implantación del nuevo formato de plan de vuelo en el SISCEAB, conforme requisitos preconizados en la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444), con entrada en vigencia el 15 de noviembre de 2012, y de acuerdo con normas y criterios que serán establecidos por el DECEA.

3.2 CRITERIOS Y MÉTODO

De acuerdo con este Plan de Acción, la implantación del nuevo formato de plan de vuelo en el SISCEAB será dividida en cuatro frentes de acción denominadas módulos:

MÓDULO 1 – LEGISLACIÓN

En el Módulo 1 están las acciones direccionadas a la revisión de la legislación brasileña vigente, bien como de los Modelos Operacionales de los órganos ATC nacionales, según sea el caso, a la luz de las modificaciones contenidas en la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444).

MÓDULO 2 – EVALUACIÓN DE SEGURIDAD OPERACIONAL

El Módulo 2 es dedicado a las acciones relativas a la Evaluación de Seguridad Operacional, teniendo en vista los posibles impactos en la operación, los cuales serán evaluados, decurrentes de las alteraciones que deberán realizarse, y los riesgos asociados con ellas, que puedan ocasionar la necesidad de medidas mitigadoras y del estabelecimiento de planes de contingencia.

MÓDULO 3 – SISTEMAS AUTOMATIZADOS

Este Módulo aborda las acciones relacionadas con la actualización de los sistemas automatizados, incluyendo los estudios de impacto que serán realizados para dimensionamiento del esfuerzo necesario para la adecuación de los sistemas afectados por las modificaciones contenidas en la referida Enmienda.

MÓDULO 4 – INSTRUCCIÓN Y ENTRENAMIENTO

El Módulo 4 contempla las acciones dirigidas a la elaboración del plan de entrenamiento de los recursos humanos que necesitan conocer y saber aplicar los conceptos modificados, en especial los controladores de tránsito aéreo y operadores de Sala AIS.

De esa forma, la estructura de este Plan ha sido establecida con base en una herramienta de calidad utilizada para planificar las acciones que serán ejecutadas, sirviendo también de instrumento de acompañamiento por medio del código de colores, marcándose el estado actual de la ejecución de la medida o acción.

El método, denominado 5W1H, es una pequeña lista de verificaciones conteniendo los seis puntos principales de un Plan de Acción. Tiene su origen en seis palabras del inglés:

WHAT – WHEN – WHO – WHY – WHERE – HOW

En portugués:

O QUE – QUANDO – QUEM – POR QUE – ONDE – COMO

Este documento se presenta en formato de una planilla (Anexo A), que servirá para coordinar, mantener y controlar las acciones que deberán ser tomadas dentro de un plazo, para la consecución del objetivo estipulado.

3.3 ACCIONES, RESPONSABILIDADES Y PLAZOS

Para permitir mayor agilidad en las coordinaciones de naturaleza técnica y operacional, cada Estado debe designar una persona que actuará como punto de contacto para las coordinaciones con la OACI, así como con otros Estados, durante la fase de transición, en la implantación de las modificaciones para el nuevo formato de plan de vuelo, conforme solicitud contenida en la carta SA224, del 14 de abril de 2010, enviada por la Oficina Regional SAM de la OACI a todos os Estados de la Región SAM, solicitándoles la designación hasta el día 7 de mayo de 2010.

En ese sentido, el DECEA ha designado el Ten Cel Esp CTA Jorge Wilson de **Avila** Ferreira Penna, Adjunto del Jefe de la Subdivisión de Planificación de la División de Gestión de la Navegación Aérea del SDOP, como punto de contacto para la OACI.

También es necesario, conforme figura en el informe final de la SAM/IG/5, que cada Estado priorice la creación de un comité nacional, compuesto por los proveedores de los servicios de navegación aérea y por usuarios, con el intuito de que ese grupo coordine los trabajos de implantación del nuevo formato de plan de vuelo por medio de reuniones de coordinación.

Para que se logren los objetivos previstos en este Plan de Acción, la siguiente acción de carácter inmediato debe ser adoptada, sirviendo de base para los demás puntos listados:

Acción Inmediata – Establecimiento del Comité para implantación de la Enmienda 1 (Doc 4444), compuesto por representantes de los diversos segmentos involucrados (Subdepartamentos, Órganos Regionales, CISCEA, CGNA, ICEA, PAME, ANAC, INFRAERO, ATECH, EMPRESAS AÉREAS, SNEA, SNETA, ABAG, etc).

Plazo: Inmediato, con inclusión en la agenda de la primera reunión el 14/10/10.
Responsable: VICEA.

A partir de estas acciones iniciales, este Plan establece las siguientes acciones que deberán ser desarrolladas dentro de los cuatro/módulos:

3.3.1 MÓDULO 1 – LEGISLACIÓN

Gerente del Módulo: Maj Av Miguel (nor@decea.gov.br)

Ítem 1.1 – Actualización de las legislaciones nacionales afectadas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444).

Ítem 1.1.1 Acción: Analizar el contenido de la referida Enmienda, visando evaluar el impacto en las legislaciones nacionales, por medio de reuniones internas de la Subdivisión de Normas (NOR1, NOR2 y NOR4).
Plazo: 27/08/10.
Responsable: SDOP (NOR).

Ítem 1.1.2 Acción: Elaborar informe preliminar, a fin de documentar los tópicos encontrados, visando orientar los trabajos del GT de actualización de las normas, por medio de descripción sucinta de los tópicos afectados.
Plazo: 03/09/10.
Responsable: SDOP (NOR).

Ítem 1.1.3 Acción: Exponer las conclusiones del informe y las acciones orientadoras al GT, visando orientar las acciones del trabajo, por medio de reunión con el personal del GT y de las demás áreas involucradas que se consideren necesarias.
Plazo: 10/09/10.
Responsable: SDOP (NOR).

Ítem 1.1.4 Acción: Elaborar propuestas de enmienda a las legislaciones pertinentes, visando la actualización de las legislaciones nacionales sobre el tema, por medio de grupo de trabajo con representantes de la NOR, de los CINDACTA/SRPV y del CGNA.
Plazo: 31/03/11.
Responsable: SDOP (NOR).

Ítem 1.1.5 Acción: Presentar las propuestas de enmiendas elaboradas, con la finalidad de divulgar las modificaciones de las normas decurrentes de la referida enmienda, por medio de reunión con jefes de DO de los CINDACTA/SRPV y del CGNA.
Plazo: 29/04/11.
Responsable: SDOP (DGNA).

Ítem 1.1.6 Acción: Actualizar los Modelos Operacionales, según sea el caso, con relación a las partes afectadas por las enmiendas a las normas nacionales, teniendo en vista que los referidos Modelos Operacionales pueden contener informaciones afectadas por las modificaciones que serán realizadas, por medio de un GT con representantes de la DO de los CINDACTA/SRPV.
Plazo: 29/07/11.
Responsable: Jefes de las DO (CINDACTA/SRPV).

Ítem 1.1.7 Acción: Presentar las propuestas de modificación de los Modelos Operacionales, en los temas afectados por las propuestas de enmienda elaboradas, visando consolidar las alteraciones que serán realizadas en los respectivos Modelos, por medio de GT con representantes de la DO de los CINDACTA/SRPV.
Plazo: 17/08/11.
Responsable: Jefes de las DO (CINDACTA/SRPV).

Ítem 1.1.8 Acción: Publicar enmienda a las legislaciones pertinentes, considerando la fase de transición, visando actualizar las legislaciones nacionales sobre el tema, por medio del envío al PAME de las enmiendas que serán

publicadas para efectuación el 01 Jul 2012.
Plazo: 01/02/12.
Responsable: SDOP (NOR).

Ítem 1.1.9 Acción: Publicar enmienda a las legislaciones pertinentes, considerando la fase de transición concluida, visando actualizar las legislaciones nacionales sobre el tema, por medio del envío al PAME de las enmiendas que serán publicadas para efectuación el 15 Nov 2012.
Plazo: 20/07/12.
Responsable: SDOP (NOR).

3.3.2 MÓDULO 2 – EVALUACIÓN DE SEGURIDAD OPERACIONAL

Gerente del Módulo: Cap Esp CTA Nobre (asegcea-4@decea.gov.br)

Ítem 2.1 – Elaboración de la evaluación de seguridad operacional, considerando las modificaciones producidas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444).

Ítem 2.1.1 Acción: Describir el sistema, visando establecer la situación actual y futura que serán consideradas, por medio de análisis de las alteraciones que serán implementadas.
Plazo: 01/10/10.
Responsable: ASEGCEA.

Ítem 2.1.2 Acción: Identificar los peligros, visando definir las áreas que puedan ser fuentes de peligro, por medio de reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo).
Plazo: 15/10/10.
Responsable: ASEGCEA.

Ítem 2.1.3 Acción: Evaluar preliminarmente los riesgos, visando elaborar una clasificación preliminar de los riesgos asociados a la mudanza, por medio de reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo).
Plazo: 22/10/10.
Responsable: ASEGCEA.

Ítem 2.1.4 Acción: Elaborar informe preliminar, a fin de documentar los tópicos analizados, visando orientar los trabajos de la evaluación, por medio de descripción sucinta de los tópicos analizados.
Plazo: 29/10/10.
Responsable: ASEGCEA.

Ítem 2.1.5 Acción: Exponer las conclusiones del informe y las acciones orientadoras, visando estandarizar las acciones del proceso de evaluación, por medio de reunión con el personal del SGSO y de las demás áreas que se consideren necesarias involucradas en el trabajo de

análisis.

Plazo: 04/11/10.
Responsable: ASEGCEA.

Ítem 2.1.6 Acción: Establecer las medidas mitigadoras, visando mantener el control de los riesgos en niveles aceptables, por medio de reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo).
Plazo: 10/12/10.
Responsable: ASEGCEA.

Ítem 2.1.7 Acción: Elaborar la evaluación preliminar, centrada en eventuales medidas de contingencia, a fin de mensurar, previamente, el esfuerzo que será consumido en medidas mitigadoras, por medio del análisis preliminar con el apoyo de los medios del SGSO.
Plazo: 31/03/11.
Responsable: ASEGCEA.

Ítem 2.1.8 Acción: Presentar la evaluación de seguridad operacional preliminar, a fin de divulgar la evaluación preliminar realizada, decurrente de la aplicación de la referida Enmienda, por medio de reunión con jefes de DO de los CINDACTA/SRPV.
Plazo: 29/04/11.
Responsable: ASEGCEA.

Ítem 2.1.9 Acción: Elaborar la planificación de implementación de las medidas mitigadoras, visando definir los plazos y los responsables por la implementación de las medidas mitigadoras, por medio de reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo).
Plazo: 27/05/11.
Responsable: ASEGCEA.

Ítem 2.1.10 Acción: Elaborar el Documento de Gestión del Riesgo a la Seguridad Operacional (DGRSO), visando concluir el proceso de elaboración de la evaluación de seguridad operacional, por medio de reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo).
Plazo: 29/07/11.
Responsable: ASEGCEA.

Ítem 2.1.11 Acción: Presentar la evaluación de seguridad operacional, a fin de divulgar el resultado del trabajo con los riesgos detectados y las medidas mitigadoras, incluyendo las contingencias, por medio de reunión con jefes de DO de los CINDACTA/SRPV.
Plazo: 17/08/11.
Responsable: ASEGCEA.

Ítem 2.1.12 Acción: Divulgar el DGRSO, visando dar a conocer los resultados de la

evaluación de seguridad operacional realizada para la implantación de la referida enmienda, por medio de su encaminamiento oficial para las organizaciones y los sectores involucrados en la implementación de las medidas mitigadoras.
Plazo: 30/08/11.
Responsable: ASEGCEA.

3.3.3 MÓDULO 3 – SISTEMAS AUTOMATIZADOS

Gerente del Módulo: Maj Eng Santoro (ddte7@decea.gov.br)

Ítem 3.1 – Actualización de los sistemas automatizados afectados por las modificaciones contenidas en la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444).

Ítem 3.1.1 Acción: Analizar el contenido de la referida Enmienda, a fin de evaluar el alcance de las modificaciones que serán implementadas, por medio de reuniones internas con la participación de representantes del SDTE y de la CISCEA.
Plazo: 25/08/10.
Responsable: SDTE.

Ítem 3.1.2 Acción: Identificar los posibles impactos de la implementación del nuevo formato de plan de vuelo, a fin de listar los sistemas que serán actualizados, afectados por la aplicación de la Enmienda, por medio de reuniones con los diversos segmentos involucrados (desarrolladores, mantenedores, proveedores de sistemas, etc.).
Plazo: 26/08/10.
Responsable: SDTE.

Ítem 3.1.3 Acción: Elaborar informe con los posibles impactos detectados, a fin de consubstanciar respuesta a la consulta realizada por la Oficina Regional SAM de la OACI, por medio de descripción sucinta de los tópicos y relleno de la planilla de Evaluación de Impactos elaborada por el Proyecto C3.
Plazo: 30/08/10.
Responsable: SDTE.

Ítem 3.1.4 Acción: Evaluar las capacidades actuales y futuras de procesamiento del plan de vuelo con respecto al contenido de la Enmienda 1, visando definir el esfuerzo que será consumido en las acciones de actualización de los sistemas automatizados, mediante recopilación de informaciones junto a los diversos segmentos involucrados (desarrolladores, mantenedores, proveedores de sistemas, etc.).
Plazo: 20/12/10.
Responsable: CISCEA.

Ítem 3.1.5 Acción: Especificar y contratar las actualizaciones de sistemas necesarias, para permitir el desarrollo de las actualizaciones necesarias

de los sistemas, por medio de elaboración de especificación de requisitos e instrumentos de contratación pertinentes.
Plazo: 31/03/11.
Responsable: CISCEA.

Ítem 3.1.6 Acción: Desarrollar las actualizaciones necesarias de los aplicativos, a fin de permitir los ensayos, visando la aplicación de la Enmienda, por medio de metodología de desarrollo de aplicativos críticos.
Plazo: 30/12/11.
Responsable: CISCEA.

Ítem 3.1.7 Acción: Conducir ensayos entre sistemas con capacidad de procesamiento del nuevo plan de vuelo, a fin de evaluar, anticipadamente, las alteraciones de software desarrolladas, permitiendo la ejecución de los ajustes necesarios, por medio de la creación de un prototipo, ensayos y reuniones para validación.
Plazo: 30/06/12.
Responsable: CISCEA.

Ítem 3.1.8 Acción: Definir los pasos de transición, basados en los sistemas con capacidad de procesar el formato actual y el nuevo de plan de vuelo, visando publicar las acciones de transición que serán adoptadas para conocimiento de los usuarios y demás interesados, por medio de reuniones con los diversos segmentos involucrados (desarrolladores, mantenedores, proveedores de sistemas, etc.).
Plazo: 30/06/11.
Responsable: SDOP.

Ítem 3.1.9 Acción: Conducir las acciones de transición de acuerdo con lo preestablecido, a fin de realizar la transición para el nuevo formato, por medio de monitoreo de la aplicación de los pasos acordados y divulgados para la fase de transición.
Plazo: 31/07/12.
Responsable: Comité del DECEA.

Ítem 3.1.10 Acción: Descontinuar los sistemas para apoyo del formato actual, visando la conclusión de las implementaciones y efectuación del nuevo formato, por medio de actualización de las versiones de los aplicativos involucrados de forma a permitir solamente el nuevo formato.
Plazo: 28/12/12.
Responsable: CISCEA.

3.3.4 MÓDULO 4 – INSTRUCCIÓN Y ENTRENAMIENTO

Gerente del Módulo: Ten Cel Av Moraes (pln@decea.gov.br)

Ítem 4.1 – Instrucción con relación a las normas nacionales afectadas por las modificaciones

contenidas en la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444).

Ítem 4.1.1 Acción: Presentar las enmiendas elaboradas para las normas nacionales, visando divulgar las modificaciones de esas normas, decurrentes de la aplicación de la Enmienda 1 al PANS-ATM, por medio de reunión con los usuarios, representantes de los órganos regionales y demás interesados.
Plazo: 05/05/11.
Responsable: SDOP (DGNA).

Ítem 4.1.2 Acción: Elaborar programación para seminarios internos, a fin de planificar su divulgación para el público interno, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de grupo de trabajo con representantes del SDOP, para elaboración del material necesario para los seminarios.
Plazo: 17/06/11.
Responsable: SDOP (PLN).

Ítem 4.1.3 Acción: Elaborar programación para seminarios externos, a fin de planificar su divulgación para el público externo (usuarios civiles y militares), por medio de grupo de trabajo con representantes del SDOP, para elaboración del material necesario para los seminarios.
Plazo: 17/06/11.
Responsable: SDOP (PLN).

Ítem 4.1.4 Acción: Realizar seminario, visando capacitar el público interno del CINDACTA 1, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 01/09/11.
Responsable: Jefe de la DO (CINDACTA 1).

Ítem 4.1.5 Acción: Realizar seminario, visando capacitar el público interno del CINDACTA 2, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 15/09/11.
Responsable: Jefe de la DO (CINDACTA 2).

Ítem 4.1.6 Acción: Realizar seminario, visando capacitar el público interno del CINDACTA 3, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 29/09/11.

Responsable: Jefe de la DO (CINDACTA 3).

Ítem 4.1.7 Acción: Realizar seminario, visando capacitar el público interno del CINDACTA 4, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 20/10/11.
Responsable: Jefe de la DO (CINDACTA 4).

Ítem 4.1.8 Acción: Realizar seminario, visando capacitar el público interno del SRPV SP, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional .
Plazo: 10/11/11.
Responsable: Jefe de la DO (SRPV SP).

Ítem 4.1.9 Acción: Realizar seminario en el DECEA, visando capacitar el público externo (usuarios civiles y militares), por medio de instrucción a los usuarios, impartida por representantes del SDOP.
Plazo: 28/11/11.
Responsable: SDOP (DGNA).

Ítem 4.1.10 Acción: Realizar seminario en la ciudad de São Paulo, visando capacitar el público externo (usuarios civiles y militares), por medio de instrucción a los usuarios, impartida por representantes de la División de Operaciones del SRPV SP.
Plazo: 01/12/11.
Responsable: Jefe de la DO (SRPV SP).

Ítem 4.1.11 Acción: Realizar seminario centrado en los aspectos de la fase de transición y de las medidas de contingencia, visando capacitar el público interno del CINDACTA 1, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 01/03/12.
Responsable: Jefe de la DO (CINDACTA 1).

Ítem 4.1.12 Acción: Realizar seminario centrado en los aspectos de la fase de transición y de las medidas de contingencia, visando capacitar el público interno del CINDACTA 2, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 08/03/12.
Responsable: Jefe de la DO (CINDACTA 2).

Ítem 4.1.13 Acción: Realizar seminario centrado en los aspectos de la fase de transición y de las medidas de contingencia, visando capacitar el público interno del CINDACTA 3, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 15/03/12.
Responsable: Jefe de la DO (CINDACTA 3).

Ítem 4.1.14 Acción: Realizar seminario centrado en los aspectos de la fase de transición y de las medidas de contingencia, visando capacitar el público interno del CINDACTA 4, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 22/03/12.
Responsable: Jefe de la DO (CINDACTA 4).

Ítem 4.1.15 Acción: Realizar seminario centrado en los aspectos de la fase de transición y de las medidas de contingencia, visando capacitar el público interno del SRPV SP, en especial el que pertenece a las áreas ATM, AIS y COM, por medio de instrucción al efectivo operacional del órgano regional, impartida por representantes de la División de Operaciones del órgano regional.
Plazo: 29/03/12.
Responsable: Jefe de la DO (SRPV SP).

Ítem 4.1.16 Acción: Realizar seminario, en el DECEA, centrado en los aspectos de la fase de transición y de las medidas de contingencia, visando capacitar el público externo (usuarios civiles y militares), por medio de instrucción a los usuarios, impartida por representantes del SDOP.
Plazo: 02/04/12.
Responsable: SDOP (DGNA).

Ítem 4.1.17 Acción: Realizar seminario, en la ciudad de São Paulo, centrado en los aspectos de la fase de transición y de las medidas de contingencia, visando capacitar el público externo (usuarios civiles y militares), por medio de instrucción a los usuarios, impartida por la División de Operaciones del SRPV SP.
Plazo: 05/04/12.
Responsable: Jefe de la DO (SRPV SP).

Ítem 4.1.18 Acción: Realizar instrucción específica, en la sede de todos los Órganos Regionales, reforzando los aspectos operacionales de la fase de transición y las medidas de contingencia, visando instruir el público interno, en especial el que pertenece a las áreas ATM, AIS y COM de

los Destacamentos, por medio de designación de representantes del órgano regional para que impartan instrucción al efectivo operacional de los Destacamentos en formato de seminario.
Plazo: 28/06/12.
Responsable: Jefes de DO.

4 DISPOSICIONES FINALES

4.1 Habiendo necesidad operacional, condiciones técnicas y recursos disponibles, los módulos de acción podrán ser desarrollados con antelación a lo planificado.

4.2 Las prioridades de las acciones propuestas en este Plan podrán ser alteradas de acuerdo con las necesidades operacionales y recursos disponibles.

4.3 Los casos no previstos en este Plan de Acción serán sometidos a la apreciación del Excmo. Sr. Director-General del DECEA.

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ANEXO A

PLANILLA DE CONTROL

DEPARTAMENTO DE CONTROL DEL ESPACIO AÉREO
SUBDEPARTAMENTO DE OPERACIONES

Av. General Justo nº 160 Castelo

Rio de Janeiro RJ Cep 20021-130

PLAN DE ACCIÓN

Nº 001 **/SDOP** **FECHA: 30 / 07 / 10**

IMPLANTACIÓN DEL NUEVO FORMATO DE PLAN DE VUELO CON LA APLICACIÓN DE LA ENMIENDA 1 A LA 15ª EDICIÓN DEL PANS-ATM DE LA OACI (DOC 4444)

LEGISLACIÓN

CONTROL DE SITUACIÓN (STATUS): SIN EMPEZAR | EN CURSO | RETRASADO | CONCLUIDO

ÍTEM	QUE	POR QUE	QUIEN	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 1 - LEGISLACIÓN									
1.1	Actualización de las legislaciones nacionales afectadas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
1.1.1	Analizar el contenido de la referida Enmienda	Evaluar el impacto en las legislaciones nacionales	SDOP NOR	Reuniones internas de la Subdivisión de Normas (NOR1, NOR2 y NOR4)	DECEA	23/08/10	27/08/10		
1.1.2	Elaborar informe preliminar	Documentar los tópicos encontrados visando orientar los trabajos del GT de actualización de las normas	SDOP NOR	Descripción sucinta de los tópicos afectados	DECEA	30/08/10	03/09/10		
1.1.3	Exponer las conclusiones del informe y las acciones orientadoras al GT	Orientar las acciones del trabajo del GT	SDOP NOR	Reunión con el personal del GT y de las demás áreas involucradas que se consideren necesarias	DECEA	09/09/10	10/09/10		
1.1.4	Elaborar propuestas de enmienda a las legislaciones pertinentes	Proponer actualización de las legislaciones nacionales sobre el tema	SDOP NOR	Grupo de trabajo con representantes de la NOR de los CINDACTA/SRPV y del CGNA	DECEA	20/09/10	31/03/11		
1.1.5	Presentar las propuestas de enmienda elaboradas	Divulgar las modificaciones de las normas decurrentes de la referida enmienda	SDOP DGNA	Reunión con jefes de DO de los CINDACTA/SRPV y del CGNA	DECEA	28/04/11	29/04/11		

CONTROL DE SITUACIÓN (STATUS):	SIN EMPEZAR	EN CURSO	RETRASADO	CONCLUIDO

ÍTEM	QUE	POR QUE	QUIEN	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 1 - LEGISLACIÓN									
1.1	Actualización de las legislaciones nacionales afectadas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
1.1.6	Actualizar los Modelos Operacionales, según sea necesario, con relación a las partes afectadas por las enmiendas a las normas nacionales	Modelos Operacionales pueden contener informaciones afectadas por las modificaciones que serán llevadas a cabo	CINDACTA 1 DO	Grupo de trabajo con representantes de la DO del CINDACTA/SRPV	CINDACTA 1	16/05/11	29/07/11		
			CINDACTA 2 DO		CINDACTA 2	16/05/11	29/07/11		
			CINDACTA 3 DO		CINDACTA 3	16/05/11	29/07/11		
			CINDACTA 4 DO		CINDACTA 3	16/05/11	29/07/11		
			SRPVSP DO		SRPVSP	16/05/11	29/07/11		
1.1.7	Presentar las propuestas de modificación de los Modelos Operacionales en los temas afectados por las propuestas de enmienda elaboradas	Consolidar las alteraciones que serán llevadas a cabo en los Modelos Operacionales	CINDACTA 1 DO	Grupo de trabajo con representantes de la DO del CINDACTA/SRPV	DECEA	16/08/11	17/08/11		
			CINDACTA 2 DO						
			CINDACTA 3 DO						
			CINDACTA 4 DO						
			SRPVSP DO						
1.1.8	Publicar enmienda a las legislaciones pertinentes considerando la fase de transición	Actualizar las legislaciones nacionales sobre el tema	SDOP NOR	Enviar al PAME las enmiendas que serán publicadas para efectuación el 01 Jul 2012	DECEA	01/02/12	01/02/12		
1.1.9	Publicar enmienda a las legislaciones pertinentes considerando concluida la fase de transición	Actualizar las legislaciones nacionales sobre el tema	SDOP NOR	Enviar al PAME las enmiendas que serán publicadas para efectuación el 15 Nov 2012	DECEA	20/07/12	20/07/12		

DEPARTAMENTO DE CONTROL DEL ESPACIO AÉREO
SUBDEPARTAMENTO DE OPERACIONES

Av. General Justo nº 160 Castelo

Rio de Janeiro RJ Cep 20021-130

PLAN DE ACCIÓN

Nº 002 /SDOP FECHA: 30 / 07 / 10

IMPLANTACIÓN DEL NUEVO FORMATO DE PLANO DE VUELO CON LA APLICACIÓN DE LA ENMIENDA 1 A LA 15ª EDICIÓN DEL PANS-ATM DE LA OACI (DOC 4444)

EVALUACIÓN DE SEGURIDAD OPERACIONAL

CONTROL DE SITUACIÓN (STATUS): SIN EMPEZAR EN CURSO RETRASADO CONCLUIDO

ÍTEM	QUE	POR QUE	QUIEN	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 2 – EVALUACIÓN DE SEGURIDAD OPERACIONAL									
2.1	Elaboración de la evaluación de seguridad operacional, considerando las modificaciones producidas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
2.1.1	Describir el sistema	Establecer la situación actual y futura que serán consideradas	ASEGCEA	Análisis de las alteraciones que serán implementadas	DECEA	13/09/10	01/10/10		
2.1.2	Identificar los peligros	Identificar las áreas que puedan ser fuentes de peligro	ASEGCEA	Reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo)	DECEA	04/10/10	15/10/10		
2.1.3	Evaluar los riesgos preliminarmente	Clasificar preliminarmente los riesgos asociados al cambio	ASEGCEA	Reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo)	DECEA	18/10/10	22/10/10		
2.1.4	Elaborar informe preliminar	Documentar los tópicos analizados, visando orientar los trabajos de evaluación	ASEGCEA	Descripción sucinta de los tópicos analizados	DECEA	25/10/10	29/10/10		
2.1.5	Exponer las conclusiones del informe y las acciones orientadoras	Estandarizar las acciones del proceso de evaluación	ASEGCEA	Reunión con el personal del SGSO y de las demás áreas que se consideren necesarias involucradas en el trabajo de análisis	DECEA	03/11/10	04/11/10		
2.1.6	Establecer las medidas mitigadoras	Mantener el control de los riesgos en niveles aceptables	ASEGCEA	Reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo)	DECEA	16/11/10	10/12/10		
2.17	Elaborar la evaluación preliminar, centrando en eventuales medidas de contingencia	Evaluación preliminar del esfuerzo a ser consumido en medidas mitigadoras	ASEGCEA	Proceder al análisis preliminar con el apoyo de los medios del SGSO	DECEA	13/12/10	31/03/11		
2.1.8	Presentar la evaluación de seguridad operacional preliminar	Divulgar la evaluación preliminar realizada decurrente de la aplicación de la referida enmienda	ASEGCEA	Reunión con jefes de DO de los CINDACTA/SRPV	DECEA	28/04/11	29/04/11		
2.1.9	Elaborar la planificación de implementación de las medidas mitigadoras	Definir los plazos y los responsables para la implementación de las medidas mitigadoras	ASEGCEA	Reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo)	DECEA	02/05/11	27/05/11		

CONTROL DE SITUACIÓN (STATUS):	SIN EMPEZAR	EN CURSO	RETRASADO	CONCLUIDO

ÍTEM	QUE	POR QUE	QUIEN	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 2 – EVALUACIÓN DE SEGURIDAD OPERACIONAL									
2.1	Elaboración de la evaluación de seguridad operacional, considerando las modificaciones producidas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
2.1.10	Elaborar el documento de gestión del riesgo a la seguridad operacional (DGRSO)	Concluir la elaboración de la evaluación de seguridad operacional	ASEGCEA	Reuniones con el equipo de expertos de las áreas involucradas en el análisis (equipo de gestión del riesgo)	DECEA	30/05/11	29/07/11		
2.1.11	Presentar la evaluación de seguridad operacional	Divulgar el resultado del trabajo con los riesgos detectados y las medidas mitigadoras, incluyendo las contingencias	ASEGCEA	Reunión con jefes de DO de los CINDACTA/SRPV	DECEA	16/08/11	17/08/11		
2.1.12	Divulgar el DGRSO	Divulgar la evaluación de seguridad operacional realizada para la implantación de la referida enmienda	SDOP	Encaminar, oficialmente, para las organizaciones y los sectores involucrados en la implementación de las medidas mitigadoras	DECEA	30/08/11	30/08/11		

DEPARTAMENTO DE CONTROL DEL ESPACIO AÉREO
SUBDEPARTAMENTO DE OPERACIONES

Av. General Justo nº 160 Castelo

Rio de Janeiro RJ Cep 20021-130

PLAN DE ACCIÓN

Nº 003 /SDOP FECHA: 30 / 07 / 10

IMPLANTACIÓN DEL NUEVO FORMATO DE PLANO DE VUELO CON LA APLICACIÓN DE LA ENMIENDA 1 A LA 15ª EDICIÓN DEL PANS-ATM DE LA OACI (DOC 4444)

SISTEMAS AUTOMATIZADOS

CONTROL DE SITUACIÓN (STATUS): SIN EMPEZAR | EN CURSO | RETRASADO | CONCLUIDO

ÍTEM	QUE	POR QUE	QUEM	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 3 – SISTEMAS AUTOMATIZADOS									
3.1	Actualización de los sistemas automatizados afectados por las modificaciones producidas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
3.1.1	Analizar el contenido de la referida Enmienda	Evaluar el alcance de las modificaciones que serán implementadas	SDTE	Con la participación de representantes del SDTE y de la CISCEA	SDTE	16/08/10	25/08/10		
3.1.2	Identificación de los posibles impactos de la implantación del nuevo formato de plan de vuelo	Identificar los sistemas que serán actualizados, afectados por la aplicación de la Enmienda	SDTE	Reuniones con los diversos segmentos involucrados (desarrolladores, mantenedores, proveedores de sistemas, etc.)	SDTE	23/08/10	26/08/10		
3.1.3	Elaborar informe con los posibles impactos detectados	Consubstanciar respuesta a la consulta realizada por la Oficina Regional de la OACI en Lima	SDTE	Descripción sucinta de los tópicos y relleno de la planilla de Evaluación de Impactos elaborada por el Proyecto C3	SDTE	27/08/10	30/08/10		
3.1.4	Evaluación de las capacidades actuales y futuras de procesamiento del plan de vuelo con respecto al contenido de la Enmienda 1	Definir el esfuerzo a ser consumido en las acciones de actualización de los sistemas automatizados afectados	CISCEA	Recopilación de información junto a los diversos segmentos involucrados (desarrolladores, mantenedores, proveedores de sistemas, etc.)	CISCEA	08/09/10	20/12/10		
3.1.5	Especificar y contratar las actualizaciones de sistemas necesarias	Permitir el desarrollo de las actualizaciones necesarias de los sistemas	CISCEA	Elaboración de especificación de requisitos e instrumentos de contratación pertinentes	CISCEA	10/01/11	31/03/11		
3.1.6	Desarrollar las actualizaciones necesarias de los aplicativos	Permitir los ensayos, visando la aplicación de la Enmienda	CISCEA	Metodología de desarrollo de aplicativos críticos	CISCEA	04/04/11	30/12/11		

CONTROL DE SITUACIÓN (STATUS):	SIN EMPEZAR	EN CURSO	RETRASADO	CONCLUIDO

ÍTEM	QUE	POR QUE	QUIEN	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 3 – SISTEMAS AUTOMATIZADOS									
3.1	Actualización de los sistemas automatizados afectados por las modificaciones producidas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
3.1.7	Conducir ensayos entre sistemas con capacidad de procesamiento del nuevo plan de vuelo	Evaluar de forma anticipada las alteraciones de software desarrolladas, permitiendo la ejecución de los ajustes necesarios	CISCEA	Creación de prototipo, ensayos, reuniones para validación	CISCEA	18/07/11	30/06/12		
3.1.8	Definición de los pasos de transición basados en los sistemas: a) con capacidad de procesar ambos los formatos: el actual y el nuevo; b) que serán modernizados o implementados antes de 2012 y que serán capaces de procesar el nuevo formato de plan de vuelo	Publicar las acciones de transición que serán adoptadas para conocimiento de los usuarios y demás interesados	SDOP	Reuniones con los diversos segmentos involucrados (desarrolladores, mantenedores, proveedores de sistemas, etc.)	DECEA	24/01/11	30/06/11		
3.1.9	Conducir las acciones de transición de acuerdo con lo preestablecido	Realizar la transición para el nuevo formato	COMITÊ	Monitorear la aplicación de los pasos acordados y divulgados para la fase de transición	DECEA	01/04/12	31/07/12		
3.1.10	Descontinuar los sistemas para apoyo del formato actual	Conclusión de las implementaciones y efectuación del nuevo formato	CISCEA	Actualizar las versiones de los aplicativos involucrados para solamente permitir el nuevo formato	CISCEA	17/12/12	28/12/12		

DEPARTAMENTO DE CONTROL DEL ESPACIO AÉREO
SUBDEPARTAMENTO DE OPERACIONES

Av. General Justo nº 160 Castelo

Rio de Janeiro RJ Cep 20021-130

PLAN DE ACCIÓN

Nº 004 /SDOP FECHA: 30 / 07 / 10

IMPLANTACIÓN DEL NUEVO FORMATO DE PLAN DE VUELO CON LA APLICACIÓN DE LA ENMIENDA 1 A LA 15ª EDICIÓN DEL PANS-ATM DE LA OACI (DOC 4444)

INSTRUCCIÓN Y ENTRENAMIENTO

CONTROL DE SITUACIÓN (STATUS): SIN EMPEZAR | EN CURSO | RETRASADO | CONCLUIDO

ÍTEM	QUE	POR QUE	QUIEN	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 4 – INSTRUCIÓN Y ENTRENAMIENTO									
4.1	Instrucción con relación a las normas nacionales afectadas por las modificaciones producidas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
4.1.1	Presentar las enmiendas elaboradas para las normas nacionales	Divulgar las modificaciones de las normas nacionales decurrentes de la Enmienda 1 al PANS-ATM	SDOP DGNA	Reunión con los usuarios, representantes de los órganos regionales y demás interesados	DECEA	05/05/11	05/05/11		
4.1.2	Elaborar programación para seminarios internos	Planificar la divulgación al público interno, en especial el de las áreas ATM, AIS y COM	SDOP PLN	Grupo de trabajo con representantes del SDOP para elaboración del material necesario para los seminarios	DECEA	13/06/11	17/06/11		
4.1.3	Elaborar programación para seminarios externos	Planificar la divulgación al público externo (usuarios civiles y militares)	SDOP PLN	Grupo de trabajo con representantes del SDOP para elaboración del material necesario para los seminarios	DECEA	13/06/11	17/06/11		
4.1.4	Realizar seminario (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	CINDACTA 1 DO	Designar representantes de la DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	CINDACTA 1	30/08/11	01/09/11		
4.1.5	Realizar seminario (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	CINDACTA 2 DO	Designar representantes del DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	CINDACTA 2	13/09/11	15/09/11		
4.1.6	Realizar seminario (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	CINDACTA 3 DO	Designar representantes del DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	CINDACTA 3	27/09/11	29/09/11		
4.1.7	Realizar seminario (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	CINDACTA 4 DO	Designar representantes del DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	CINDACTA 4	18/10/11	20/10/11		
4.1.8	Realizar seminario (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	SRPV SP DO	Designar representantes del DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	SRPV SP	08/11/11	10/11/11		

CONTROL DE SITUACIÓN (STATUS):	SIN EMPEZAR	EN CURSO	RETRASADO	CONCLUIDO

ÍTEM	QUE	POR QUE	QUIEN	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 4 – INSTRUCCIÓN Y ENTRENAMIENTO									
4.1	Instrucción con relación a las normas nacionales afectadas por las modificaciones producidas en la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
4.1.9	Realizar seminario para los usuarios (público externo)	Instruir el público externo (usuarios civiles y militares)	SDOP	Designar representantes del SDOP para impartir instrucción a los usuarios en el formato de seminario	DECEA	28/11/11	28/11/11		
4.1.10	Realizar seminario para los usuarios (público externo)	Instruir el público externo (usuarios civiles y militares)	SRPV SP DO	Designar representantes de la DO para impartir instrucción a los usuarios en el formato de seminario	São Paulo	30/11/11	01/12/11		
4.1.11	Realizar seminario centrando en los aspectos de la fase de transición y de las medidas de contingencia (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	CINDACTA 1 DO	Designar representantes de la DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	CINDACTA 1	28/02/12	01/03/12		
4.1.12	Realizar seminario centrando en los aspectos de la fase de transición y de las medidas de contingencia (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	CINDACTA 2 DO	Designar representantes de la DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	CINDACTA 2	06/03/12	08/03/12		
4.1.13	Realizar seminario centrando en los aspectos de la fase de transición y de las medidas de contingencia (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	CINDACTA 3 DO	Designar representantes de la DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	CINDACTA 3	13/03/12	15/03/12		
4.1.14	Realizar seminario centrando en los aspectos de la fase de transición y de las medidas de contingencia (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	CINDACTA 4 DO	Designar representantes de la DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	CINDACTA 4	20/03/12	22/03/12		
4.1.15	Realizar seminario centrando en los aspectos de la fase de transición y de las medidas de contingencia (público interno)	Instruir el público interno, en especial el de las áreas ATM, AIS y COM	SRPV SP DO	Designar representantes de la DO para impartir instrucción al efectivo operacional del órgano regional en el formato de seminario	SRPV SP	27/03/12	29/03/12		
4.1.16	Realizar seminario para os usuarios (público externo) centrando en los aspectos de la fase de transición y de las medidas de contingencia	Instruir el público externo (usuarios civiles y militares)	SDOP	Designar representantes del SDOP para impartir instrucción a los usuarios en el formato de seminario	DECEA	02/04/12	02/04/12		
4.1.17	Realizar seminario para os usuarios (público externo) centrando en los aspectos de la fase de transición y de las medidas de contingencia	Instruir el público externo (usuarios civiles y militares)	SRPV SP DO	Designar representantes de la DO para impartir instrucción a los usuarios en el formato de seminario	São Paulo	04/04/12	05/04/12		

CONTROL DE SITUACIÓN (STATUS):	SIN EMPEZAR	EN CURSO	RETRASADO	CONCLUIDO

ÍTEM	QUE	POR QUE	QUIEN	COMO	DONDE	CUANDO		STATUS	OBSERVACIONES
						INICIO	TÉRMINO		
MÓDULO 4 – INSTRUCCIÓN Y ENTRENAMIENTO									
4.1	Instrucción con relación a las normas nacionales afectadas por las modificaciones producidas por la Enmienda 1 a la 15ª Edición del PANS-ATM de la OACI (Doc 4444)								
4.1.18	Realizar instrucción específica, reforzando los aspectos operacionales de la fase de transición y las medidas de contingencia	Instruir el público interno, en especial el de las áreas ATM, AIS y COM de los Destacamentos	CINDACTA 1 DO CINDACTA 2 DO CINDACTA 3 DO CINDACTA 4 DO SRPVSP DO	Designar representantes del órgano regional para impartir instrucción al efectivo operacional de los Destacamentos en el formato de seminario	CINDACTA 1 CINDACTA 2 CINDACTA 3 CINDACTA 4 SRPV SP	26/06/12	28/06/12		

APPENDIX G / APENDICE G

REQUERIMIENTOS OPERATIVOS PARA LA ACTUALIZACIÓN DEL SOFTWARE DE LOS SISTEMAS DE CONTROL DE TRANSITO AÉREO AUTOMATIZADOS DE ACUERDO A LA ENMIENDA 1 DE LA 15ª EDICIÓN DEL PANS ATM (DOC. 4444) DE LA OACI

REQUERIMIENTO	MINIMO	DESEABLE
No se presentarán con más de 120 horas de anticipación respecto de la hora prevista de fuera de calzos de un vuelo. La fecha de salida del vuelo se insertará en la casilla 18 del plan de vuelo.	• Aceptar, validar y almacenar el Plan de Vuelo • Durante el periodo de 120 horas permitir que el FPL se actualice con los mensajes DLA, CHG, CNL, DEP. • Identificación única del FPL para consulta y modificación, tomando en cuenta que se debe diferenciar al momento de actualizarlo. • Activar el FPL de acuerdo a la fecha indicada en la CASILLA 18 en DOF/, realizando la validación del Plan de Vuelo por: FECHA DE VALIDEZ, IDENTIFICACIÓN, ORIGEN, EOBT y DESTINO. el poder incluir los 5 ítems para validar un FPL, permitiría poder resolver inconvenientes que se presentan con la presentación de planes de vuelos con ítems iguales.	
CASILLA 7 - IDENTIFICACIÓN DE LA AERONAVE (MÁXIMO 7 CARACTERES)	• Identificación de la aeronave con caracteres alfanumérico sin guiones o símbolos	
CASILLA 8: REGLAS DE VUELO Y TIPO DE VUELO (UNO O DOS CARACTERES) Especifíquese en la casilla 18 el estado de un vuelo luego del indicador STS si se requiere un manejo específico de los ATS.	• Procesar los cambios de reglas de vuelo incluidos en la CASILLA 15 Ruta. • Incluir en la faja de progreso de vuelo la información de la CASILLA 18 STS/ o RMK/.	• Mostrar en la presentación del vuelo (etiqueta, representaciones gráficas de ruta), los cambios de reglas de vuelo. • Incluirla en los tabulares del sistema.

REQUERIMIENTO	MINIMO	DESEABLE
CASILLA 10 a: EQUIPO Y CAPACIDADES (radio comunicaciones y ayudas de navegación y aproximación).	• Aceptar y validar los caracteres alfanuméricos con los nuevos significados, así como lo establecido en las notas correspondientes. Se deberá tener en cuenta la cantidad de caracteres necesarios considerado las posibles evoluciones de combinaciones de estos. • La letra R debe aparecer en la etiqueta del Vuelo y en la faja de progreso de vuelo de papel o definir otra forma de alertar al CTA actuante.	• Presentación de la letra R, en lugar preferente en los tabulares de vuelos. • Visualizar en los tabulares de vuelos/fajas de progreso de vuelo la información complementaria que figure en la Casilla 18, (indicadores PBN/). • Las alarmas RAM que surjan de la inclusión de la letra R en el Plan de Vuelo deberán contemplar los diferentes requerimientos RNAV de adherencia a la ruta de acuerdo al indicador incluido después de PBN/. • Se debe validar los planes de vuelos de acuerdo al equipamiento y capacidades de la aeronave en relación a los espacios aéreos a ser utilizado. • La presentación de esta información será realizada de forma tal que no distraiga el trabajo específico del ATCO. • La IHM debe ser tal, que el ATCO acceda de la forma más rápida posible a la información que necesite.
CASILLA 10 b: Equipos y Capacidades (vigilancia)	• Aceptar y validar los caracteres alfanuméricos con los nuevos significados, así como lo establecido en las notas correspondientes. • Aceptar y validar las aplicaciones de vigilancia adicionales que se enumeran en CASILLA 18 después del indicador SUR/.	• Se debe validar los planes de vuelos de acuerdo al equipamiento y capacidades de la aeronave en relación a los espacios aéreos a ser utilizado. • La presentación de esta información será realizada de forma tal que no distraiga el trabajo específico del ATCO. • La IHM debe ser tal, que el ATCO acceda de la forma más rápida posible a la información que necesite.
CASILLA 13 Aeródromo de Salida y Hora (8 Caracteres).	• Cuando el aeródromo de Origen sea ZZZZ, presentar en la faja de progreso de vuelo y en el tabular de vuelos, lo establecido en CASILLA 18 en DEP/. (Nombre y lugar y/o el primer punto de la ruta o la radiobaliza).	

REQUERIMIENTO	MINIMO	DESEABLE
CASILLA 15 Ruta	• Aceptar y validar un punto, con marcación y distancia desde un punto significativo, este punto deberá aceptar, de 2 hasta 5 caracteres más 3 cifras para grados magnéticos más 3 cifras para las millas náuticas. • Aceptar y validar la inclusión de varios cambios de reglas de vuelo en la ruta propuesta	Mostrar en la presentación del vuelo (etiqueta, y representaciones gráficas de ruta) los cambios de reglas de vuelo.
CASILLA 16: AERÓDROMO DE DESTINO Y DURACIÓN TOTAL PREVISTA (8 Caracteres). AERÓDROMOS DE ALTERNATIVA DE DESTINO	• Cuando el aeródromo de destino sea ZZZZ, presentar en la faja de progreso de vuelo, en el tabular y en la ventana de FPL, lo establecido en Casilla 18 en DEST/. • Cuando el aeródromo de alternativa sea ZZZZ, presentar en la ventana de FPL del sistema, lo establecido en Casilla 18 en ALTN/. • La información de la CASILLA 18 (LAT/LONG o MARCACIÓN DISTANCIA) debe ser considerada para el cálculo de la ruta correspondiente.	
CASILLA 18 Otros Datos	• Esta información debe estar visible en la ventana del Plan de vuelo del sistema, dada la relevancia que la Enmienda 1 le brinda a esta casilla. Además se deberá seleccionar cuidadosamente cual de esta información se deberá reproducir en las fajas de progreso de vuelo de papel, en los tabulares, en la ventana de FPL del sistema y en las etiquetas de los vuelos.	• La Alarma RAM (Route Adherence Monitoring), deberá ser selectivas contemplando los requerimientos de los espacios aéreos que esté utilizando la aeronave. • La presentación de esta información será realizada de forma tal que no distraiga el trabajo específico del ATCO. • La IHM debe ser tal, que el ATCO acceda de la forma más rápida posible a la información que necesite.
	• **STS/** aceptar y validar todos los indicadores que figuran en la Enmienda 1, con las características ahí establecidas y aceptar otros motivos del manejo especial por parte del ATS que se anotarán bajo el indicador **RMK/**	

REQUERIMIENTO	MINIMO	DESEABLE
	• **PBN/** aceptar y validar todos los indicadores que figuran en la Enmienda 1, con las características ahí establecidas.	• Considerar una ampliación del número de caracteres para poder ampliar la información debido futuras demandas.
	• **NAV/** aceptar y validar los datos relativos al equipo de navegación no especificados en PBN/ e indicar la aumentación GNSS, dejando un espacio entre dos o más métodos de aumentación.	
	• **COM/** aceptar y validar las aplicaciones o capacidades de comunicaciones no especificadas en la CASILLA 10a.	
	• **DAT/** aceptar y validar las aplicaciones o capacidades de datos no especificadas en la CASILLA 10a.	
	• **SUR/** aceptar y validar las aplicaciones o capacidades de vigilancia no especificadas en la CASILLA 10b.	
	• **DEP/** aceptar y validar, cuando ZZZZ se inserte en la casilla 13, las informaciones de acuerdo con la Enmienda 1. Esta información deberá ser utilizada en el cálculo de ruta.	
	• **DEST/** aceptar y validar, cuando ZZZZ se inserte en la casilla 16, las informaciones de acuerdo con la Enmienda 1. Esta información deberá ser utilizada en el cálculo de ruta.	
	• **DOF/** aceptar y validar la fecha de la salida del vuelo en formato de seis cifras (AAMMDD), donde AA es el año, MM el mes y DD el día). El sistema debe mantener, actualizar y activar el FPL de acuerdo a la fecha señalada en este ítem.	
	• **REG/** aceptar y validar si esta información difiere de la identificación de la aeronave que figura en Casilla7.	

REQUERIMIENTO	MINIMO	DESEABLE
	• **EET/** aceptar y validar designadores de puntos significativos o límites de la FIR y duración total prevista desde el despegue hasta esos puntos o límites de la FIR cuando esté prescrito en acuerdos regionales de navegación aérea o por la autoridad ATS competente.	
	• **SEL/** aceptar y validar de acuerdo a lo establecido en la Enmienda 1.	
	• **TYP/** aceptar y validar de acuerdo a lo establecido en la Enmienda 1.	
	• **CODE/** aceptar y validar de acuerdo a lo establecido en la Enmienda 1.	
	• **DLE/** aceptar y validar de acuerdo a lo establecido en la Enmienda 1. Estos valores deben ser utilizados para los cálculos de las estimas de ruta que efectúa el sistema	
	• **OPR/** aceptar y validar si esta información difiere de la identificación de la aeronave que figura en Casilla7.	
	• **PER/** aceptar de acuerdo a lo establecido en la Enmienda 1.	
	• **ORGN/** aceptar y validar de acuerdo a lo establecido en la Enmienda 1.	
	• **ALTN/** aceptar y validar el lugar en LAT/LONG o la marcación y distancia respecto del punto significativo más próximo.	
	• **RALT/** aceptar y validar de acuerdo a lo establecido en la Enmienda 1.	
	• **TALT/** aceptar y validar de acuerdo a lo establecido en la Enmienda 1.	
	• **RIF/** aceptar y validar de acuerdo a lo establecido en la Enmienda 1.	

REQUERIMIENTO	MINIMO	DESEABLE
	• **RMK/** aceptar de acuerdo a lo establecido en la Enmienda 1.	
Casilla Q Observaciones (RPL)		Aceptar y validar toda la información correspondiente al vuelo, que en un FPL común se incorpora en las CASILLAS 10 y 18
Casilla G Información Suplementaria (RPL)		Disponer de la información de la Casilla G. Esta información debe quedar de fácil acceso al controlador operativo.
Mensaje de los Servicios de Tránsito Aéreo	Aceptar, validar y transmitir los mensajes en el formato y el lenguaje establecido en el Apéndice 3 de la Enmienda 1, adecuándose al sistema de transmisión de información en uso (AFTN/AMHS).	

NOTAS: Con referencia a los RPL, tomando en cuenta la posibilidad de las mensajes de actualización (DLA, CHG, CNL) y de la presentación de un FPL con hasta 120 horas de antelación a la EOBT y los impactos de las informaciones para gestión de afluencia del tránsito aéreo (ATFM), debe ser verificado cual es el mejor proceso para actualización de las base de datos de plan de vuelo.

Agenda Item 8: Other business

Results of the initiatives related to the new generation of aeronautical professionals

8.1 ICAO has initiated work to develop policies to ensure that enough competent personnel are available to manage, operate and maintain the global air transportation system of the future. As the aviation industry emerges from a difficult economic context, changing demographics and new technologies with far-reaching potential will intensify human resource challenges. In this context and in partnership with all stakeholders of the industry, it becomes urgent to consider the availability of competent human resources as a key strategic issue to implement the Global Aviation Safety Plan (GASP), to federate resources to attract and retain the next generation, to establish a permanent coordinating mechanism to address training and education issues, and to review existing regulations and propose a new regulatory environment that will facilitate the recruitment, education, training and retention of the next generation of aviation professionals.

South American Region Performance-Based Implementation Plan

8.2 SAMIG recalled that during GREPECAS/15 Meeting, (October 2008), it was informed on the ICAO significant progress in the preparation of the pertinent guidance material in the transition towards the implementation of the ATM operational concept, and in view of the need to count with a document to guide the implementation of the global plan initiatives, the meeting approved Conclusion 15/1, in order that this Group develop a performance-based regional plan, as per the global air navigation plan and the global ATM operational concept. This plan should include the identification of the performance regional objectives and performance framework forms to be completed by all air navigation areas, such as ATN, CNS, SAR, AIM, MET and AGA/AOP, leading to the fact that, in a similar way, States develop their performance-based national plans.

8.3 Further, the GREPECAS CNS/ATM/SG/1 Meeting analysed the documentation existing in the CAR and SAM Regions, requesting SAM States, through Decision CNS/ATM/SG/1-1, that with the assistance of ICAO, prepare a performance-based implementation plan for the South American Region, and to finalize it by June 2011.

8.4 In view of the above, SAM Region States, with the assistance of Regional Project RLA/06/901, committed to the reformulation of the plan that had been presented at GREPECAS/14, and as a result of the work carried out, the first draft of the South American Region Performance-Based Implementation Plan was submitted for consideration of the meeting.

8.5 The Document has been developed keeping in mind the Air Navigation Global Plan (Doc 9750), and has the aim to apply the Global Plan Initiatives (GPI) as stipulated in the mentioned Document, in order to initiate transition towards the ATM operational concept as envisaged by ICAO.

8.6 In addition, this plan is addressed to establishing an implementation strategy aimed at achieving benefits for the ATM community in the sort and mid-term (2012 – 2018), based on the ATM-related infrastructure and the available and foreseen aircraft capabilities.

8.7 The document contemplates the different air navigation areas (CNS, AIS, MET, SAR and AGA/AOP), and also considers other relevant aspects involved, necessary to go along with such evolution.

8.8 The document is developed in 11 Chapters. Chapter 1 explains the objectives, scope, history, and some deficiencies of the current Region's system are identified and how is the evolution and transition towards the ATM operational concept envisaged.

8.9 Chapter 2 makes a brief description of air traffic in the SAM Region, as well as in adjacent Regions. This information is the result of the Seventh Meeting of GREPECAS Forecast Group, where an assessment of air traffic growth up to 2007 and forecasts from that date to 2027 were made.

8.10 Chapter 3 refers to the planning considerations that were taken into account listing homogeneous areas and main air traffic flows that have been identified in the Region, the methodology and planning tools used, a brief description of the evolution foreseen, the analysis of the global plan initiatives and its integration with the SAM Region performance objectives.

8.11 Chapters 4 to 9 briefly describe the situation in each one of the air navigation areas, ATM, CNS, MET, SAR, AIS and AGA/AOP, the implementation strategies in each one of the areas and a description of the performance framework forms (PFF), including all the information related with performance objectives, main tasks required to reach such performance objective, and at the same time, maintain a direct relationship with the ATM system components.

8.12 Chapter 10 refers to the development of human resources and competence management, keeping in mind the new requirements derived from the ATM operational concept implementation and at the same time, SAM Region States are encouraged to consider planning of human resources and management of abilities, keeping in mind the air navigation global plan initiatives, as well as new regulations and requirements for implementation at short and mid-term.

8.13 Chapter 11 relates to safety, cross transversal element to all air navigation areas and emphasizes in the State Safety Programme (SSP), and the Safety Management System (SMS).

8.14 Finally, the five attachments to the document make reference to significant material to be taken into account in planning and executing regional performance objectives and particularly Attachment D of the Document collects in PFFs the 25 performance objectives formulated for the different air navigation areas.

8.15 In order to understand the inter-relationship between of PFF in the different fields, which have tasks which inter-relate inter-relation master among PFF was prepared so that planners keep in mind that in order to attend PFF tasks in particular, coordination with other areas must exist, in order to coincide in the implementation of performance objectives.

8.16 The document has been submitted for consideration of the meeting, in the understanding that it is a live document that requires full analysis by all SAM States and international organizations involved to further be presented to the Civil Aviation Directors Meeting for its adoption at a regional level, and information to GREPECAS.

8.17 The meeting initially revised this document, taking into consideration that the same responded to future civil aviation requirements in the SAM Region, and considered that the deadlines of the first tasks are in agreement with the development expected.

8.18 The meeting also analysed the most adequate name for the referred document, with a view that the same is not confused with the CAR/SAM Regions Air Navigation Plan (Doc 8733), or with the Performance-Based Navigation Manual (Doc 9613 PBN). In this connection, the meeting proposed the following provisional name: SAM Region Performance-Based Air Navigation Planning agreeing that this document be included as **Appendix A** to this part of the report and that States, as far as possible, send their comments to the Secretariat. Also, the meeting understood that it was appropriate to carry out a seminar or workshop with the support of Regional Project RLA/06/901, so as to revise the implementation plan with all parties involved, and therefore requested the Secretariat to evaluate that possibility during the forthcoming Regional Coordination Project.

APPENDIX A

INTERNATIONAL CIVIL AVIATION ORGANIZATION

SOUTH AMERICAN REGIONAL OFFICE

PERFORMANCE-BASED IMPLEMENTATION PLAN FOR THE SAM REGION

Version 1.0

October 2010

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ATTACHMENTS TO THE DOCUMENT:

ATTACHMENT A Traffic forecasts in the SAM Region
ATTACHMENT B Homogeneous Areas and Main Traffic Flows identified
ATTACHMENT C Global Plan Initiatives and their relationship with the main groups
ATTACHMENT D Performance framework form (PFF)
ATTACHMENT E Glossary of acronyms

1 Chapter 1: Foreword

1.1 Objective

1.1.1 This 'Performance-Based Plan for the SAM Region' (SAM-PBIP) has been drafted taking into account the Global Air Navigation Plan (Doc 9750), and its objective is to implement the Global Plan Initiatives (GPIs) as specified in that document, in order to begin the transition to the ATM operational concept as foreseen by ICAO.

1.1.2 Likewise, this Plan seeks to establish an implementation strategy so that benefits can be obtained for the ATM community in the short and medium term, based on the ATM-related infrastructure and available and foreseen aircraft capabilities. The document contains the air navigation infrastructure (CNS, AIS, MET, SAR and AGA/AOP) and contemplates the institutional aspects required to support such evolution.

1.2 Scope

1.2.1 This transition plan covers the SAM Region up to its boundaries, and includes the short-and medium-term implementations between 2012 and 2018, in keeping with the guidelines contained in the Global Air Navigation Plan. The long-term initiatives required for the evolution to a global ATM system, as shown in the Global ATM Operational Concept, will be added to this Plan as they are developed and approved.

1.3 Background

1.3.1 Following the progress made by States and Regional Planning and Implementation Groups in the implementation of CNS/ATM systems within the framework of the Global Air Navigation Plan (formerly Global Navigation Plan for CNS/ATM Systems), it was recognised that technology was not an end in itself and that an integrated global ATM system concept was required, based on clearly established operational requirements. This concept, in turn, would serve as the basis for the coordinated implementation of CNS/ATM technologies also based on clearly established requirements. In order to develop the concept, the ICAO Air Navigation Commission created the Air Traffic Management Operational Concept Panel (ATMCP).

1.3.2 The Global ATM Operational Concept developed by the aforementioned panel was approved by the Eleventh Air Navigation Conference (September-October 2003) and published as Doc. 9854 AN/458, through recommendation 1/1, which reads as follows:

a) ICAO, the States and the regional planning and implementation groups (PIRG) should consider the concept as the global common framework for guiding ATM system implementation planning and channelling ATM development work;

b) The global ATM operational concept should be used as high-level guidance for the development of ICAO provisions concerning CNS/ATM systems;

c) The States, with the support of other members of the ATM community, must undertake the task of validating the seven components of the global ATM operational concept (see Figure 1);

d) ICAO, the States and the PIRGs should develop transition strategies for the implementation of ATM systems based on the global ATM operational concept; and

e) ICAO should align its technical programme to facilitate the future work related to the ATM operational concept.

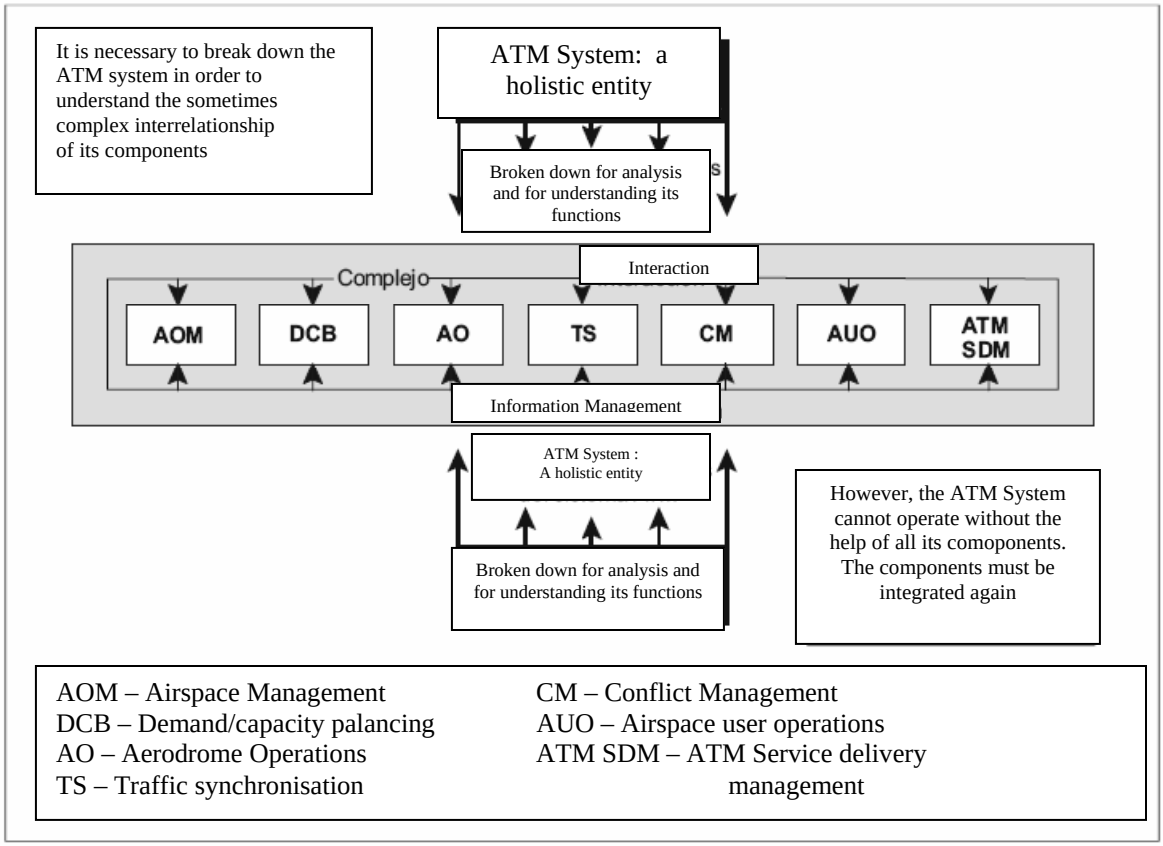

Figure 1: ATM system components

1.3.3 Following the AN-Conf/11, the Sixth Meeting of ANC Consultation with Industry was held in Montreal, on the topic "Promoting the implementation of the recommendations of the 11th Air Navigation Conference". Amongst the topics discussed, "Global ATM - From Concept to Reality" generated the following conclusion:

> "That all partners capable of doing so, work together in the preparation of a common roadmap or global action plan, with the purpose of deriving operational benefits in the short and medium term, and that said document be available for use by ICAO by mid October 2004 for submission to the Air Navigation Commission and be considered for inclusion in the Global Plan."

1.3.4 The industry roadmap included the short- and medium-term implementation activities related to CNS/ATM systems, while long-term objectives are contemplated in the operational concept. Accordingly, the Commission felt that the roadmap was fully consistent with the operational concept and that if positive results continued to be obtained, convergence would be achieved with the ATM system foreseen in the operational concept. The Global Plan and the aforementioned concept would form a complete planning structure.

1.3.5 In order to align global planning with the conclusions of the Eleventh Air Navigation Conference, mainly in relation to the Global ATM Operational Concept, as well as with the Industry Roadmap, ICAO began the development of the new Global Air Navigation Plan. In addition to including the Global ATM Operational Concept, the Global Air Navigation Plan focuses on a set of "Global Plan Initiatives" (GPIs), providing the necessary conditions for the implementations that seek to attain benefits for the ATM community in the short and medium term.

1.3.6 Within this context, the GREPECAS/15 (October 2008) took note of the significant progress made by ICAO in the drafting of the relevant guidance material. These documents include: a) the Global Air Traffic Management Operational Concept (Doc 9854); b) the Air Traffic Management System Requirements (Doc 9882); the Manual on the Global Performance of the Air Navigation System (Doc 9883); and d) the Global Air Navigation Plan (Doc 9750).

1.3.7 Likewise, GREPECAS/15 approved Conclusion 15/1 for the development by the Group of a regional performance-based plan, in keeping with the Global Air Navigation Plan and the Global ATM Operational Concept. This plan should include the identification of the regional performance objectives and the performance framework forms to be completed by all air navigation areas, such as ATM, CNS, SAR, AIM, MET and AGA/AOP. In a similar way, the States would develop their national performance-based plans.

1.3.8 Furthermore, ICAO published the Manual on Performance-Based Navigation – PBN (Doc. 9613), which identifies the relationship between RNAV and RNP applications, defining the advantages and limitations of each of them as navigation requirements. The manual provides practical guidance on implementation to make sure that performance requirements are suited to the proposed application.

1.4 Evolution and Transition

1.4.1 When considering the general system concept, evolution and transition issues are of great importance. It will be necessary to ensure the harmonisation of CNS/ATM implementation in the region, based on the PBN concept, in order to optimise the investments made in on-board systems, making sure that aircraft are not necessarily forced to carry a multiplicity of equipment and operators are not forced to request multiple operational approvals.

1.4.2 Likewise, it is necessary to make sure that the different levels of development worldwide will not create incompatibility amongst the various components of the ATM Operational Concept in the ICAO Regions. Given the broad scope of these components, the aforementioned considerations require judicious coordination of planning at regional and global level in order to achieve an optimum implementation of these systems.

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2 Chapter 2: Air Traffic in the SAM Region

2.1 Traffic Forecast in the SAM Region

2.1.1 Aircraft movement forecasts are important for anticipating when and where may airspace or airport congestion occur, and thus, are essential for planning capacity increases. These forecasts also play an important role in the implementation of ATM/CNS systems.

2.1.2 For purposes of this Plan, use has been made of the 2007-2027 forecasts prepared at the seventh meeting of the CAR/SAM Forecasting Group (Doc. 9917) that are relevant for the SAM Region within the framework of homogeneous areas (AR) and main flows (see section 3.2 of this Plan). Accordingly, it is interesting to analyse the percentage of growth expected for that period, as shown in the tables contained in Attachment A to this document.

2.1.3 In summary, passenger traffic in the South American Region during the 2007-2027 period is expected to increase at an annual rate of 8.8%, reaching 73 million passengers in 2027. The aircraft movement forecast for the same period shows an annual increase of 7.9%, reaching 497.000 movements for 2027.

2.1.4 Always within the 2007-2027 period, it is expected that passengers between South American and Central America and the Caribbean will increase 8.9%, reaching 27 million passengers in 2027. Aircraft movement for that period may reach a figure of 8.2%, with 282.000 movements in 2027.

2.1.5 Between South America and North America for the period 2007 – 2027, an increase of 5.7% is expected per year, reaching a figure of about 173 million passengers for 2027. Aircraft movements may reach 5%, or 1.625.700 movements in 2027.

2.1.6 Finally, with respect to the South Atlantic, the Europe-South America corridor specifically, a growth of 5.4% a year is expected, reaching an approximate figure of 21.5 million passengers for 2027 and a growth in aircraft movements of 5.5%, reaching more than 90.000 movements in 2027.

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3 Chapter 3: Planning Considerations

3.1 Introduction

3.1.1 As traffic volume increases throughout the world, the demands on air navigation service providers in a given airspace increase, and air traffic management becomes more complex. Increased traffic density brings about an increase in the number of flights that cannot fly their optimum path.

3.1.2 It is foreseen that the implementation of the components of the ATM operational concept will provide sufficient capacity to meet the growing demand, generating additional benefits in terms of more efficient flights and higher levels of safety. Nevertheless, the potential of new technologies to significantly reduce the cost of services will require the establishment of clear operational requirements.

3.1.3 Taking into account the benefits of the ATM operational concept, it is necessary to make many timely decisions for its implementation. An unprecedented cooperation will be required at both global and regional level.

3.1.4 The regional planning process is the main factor in ICAO planning and implementation work. It is here where the top-down approach, which includes global guidance and regional harmonisation, converges with the bottom-up approach of States and aircraft operators and their proposals concerning implementation alternatives.

3.1.5 In its most elementary form, the result of the regional planning process is a list of air navigation facilities and the dates in which they could be available, information that is required for the implementation of the Global Plan Initiatives, leaading to a gradual transition towards the ATM Operational Concept. These lists will be incorporated into the CAR/SAM Regional Air Navigation Plan (ANP), and will be kept up to date by the CAR/SAM Regional Planning and Implementation Group (GREPECAS), with the assistance of the ICAO Regional Offices.

3.1.6 This plan is a guide for the gradual, coordinated, timely, cost-effective and global implementation of the components of the ATM operational concept, taking into account the Global Plan Initiatives (GPIs) that may be implemented in the short and medium term. Accordingly, the plan fulfils two main functions:

a) It provides guidelines to regional planning organisations, States/Territories, service providers and users for the transition to the ATM operational concept.

b) It measures implementation progress.

3.1.7 The planning of the implementation of the components of the ATM operational concept, as well as the development of guidelines to ensure a harmonious and integrated implementation, should be basically a regional responsibility, while the implementation is the responsibility of the States/Territories or groups of States/Territories and International Organisations, working together within the concept framework and the implementation strategy developed by GREPECAS for the two Regions. However, each CAR and SAM State must develop and publish its own plan for the transition to the ATM operational concept.

3.1.8 Regional planning should take into account the intrinsic characteristics of the components of the ATM operational concept, whose application on facilities may go beyond national boundaries, thus requiring the implementation of multinational facilities to avoid duplication of resources and services. The relevant institutional aspects shold be taken into account for the implementation of multinational facilities. These aspects, in general, cover all matters related to technical, operational, financial and legal issues, which should be taken into account when considering the establishment of multinational facilities.

3.1.9 In view of the above and the need to develop an appropriate structure for the implementation of multinational facilities, regional coordination is underway to establish a SAM Regional Multinational Organisation, aimed at ensuring the optimisation of the investments required for the implementation and maintenance of air navigation services. In this sense, during the first semester of 2010, six SAM States signed an Agreement of Incorporation.

3.1.10 The planning period under consideration is 2012-2018.

3.2 ATM Homogeneous Areas and Main International Traffic Flows

ATM Homogeneous Area

3.2.1 A homogeneous ATM area is airspace with a common ATM interest, based on similar air navigation system characteristics in terms of traffic density, complexity, infrastructure requirements or other specified considerations, in which a detailed common plan will foster the implementation of interoperable ATM systems. ATM homogeneous areas may cover States, specific parts of States or groups of States. It may also cover extensive oceanic and continental areas. Areas of interest and common requirements are taken into account.

3.2.2 As stated in the ATM Operational Concept, ATM homogeneous areas and/or routing areas should be minimised and consideration be given to the merging of adjacent areas.

Main Traffic Flows

3.2.3 A main traffic flow is a concentration of significant air traffic volumes on the same path or on flight paths that are near each other. Main traffic flows may cross several ATM homogenous areas with different characteristics.

3.2.4 ATM homogeneous areas and main traffic flows are especially related to the en-route airspace. However, the enhancement of the capacity and efficiency of terminal control areas (TMA) and aerodromes, and working based on a set of common initiatives, will serve as an important basis for achieving a homogeneous ATM system. Therefore, several Global Plan Initiatives were specifically drafted to improve aerodrome and TMA operations.

3.2.5 The most significant air traffic flows in the SAM Region reach the boundaries between the SAM Region with the AFI, CAR, EUR, NAM, NAT and PAC Regions. **Attachment B to this Plan** shows the Main Traffic Flows identified in the Homogeneous Areas of the SAM Region, in keeping with the Global Air Navigation Plan (Doc 9750).

3.3 Planning Methodology

3.3.1 After identifying ATM homogeneous areas and the main traffic flows, GREPECAS conducted a study of the current and foreseen fleet of aircraft and their capabilities, the forecast traffic figures and ATM infrastructure, including human resource availability and requirements, amongst other elements. The analysis of the collected data revealed performance "gaps". Global Plan Initiatives were assessed with respect to these gaps in order to identify those that would provide the operational improvements required to meet the performance objectives in the SAM Region, and will be discussed in detail in the following chapters.

3.3.2 This planning process will continue with the development of different options for the implementation of the initiatives, a profitability analysis of these different options, and the preliminary development of auxiliary requirements concerning infrastructure. Additional steps will include the drafting of implementation plans and funding profiles, a more in-depth analysis of human resource requirements to support the initiatives identified, followed by additional profitability analyses. Finally, national and regional implementation plans would be drafted or amended based on the selected initiatives. It is a process that may require the repetition of several steps until the initiatives are finally selected. Once available, planning tools will help GREPECAS to carry out the aforementioned steps. Figure 2 shows a planning flow diagram.

3.3.3 The work for the SAM Region is organised based on project management techniques and clearly defined performance objectives to support the Global Plan strategic objectives aligned with the ICAO strategic plan.

3.3.4 All of the activities listed in the performance objectives will be designed based on strategies, concepts, action plan models and roadmaps that may be shared in order to align the inter-regional work with the main objective of maximising interoperability and transparency.

3.3.5 Planning of all the activities should ensure an efficient use of resources, avoiding duplicated or unnecessary activities or tasks, so as to make sure that such activities/tasks can be easily adjusted to the SAM Region. Planning should also encourage the optimisation of human resources, financial savings, and the use of electronic media, such as the Internet, videoconferences, teleconferences, e-mail, telephone and fax.

3.3.6 The new processes and work methods must make sure that performance objectives can be measured, based on timetables and regional progress reports to the ICAO Council and the Air Navigation Commission.

3.3.7 Based on this Implementation Plan, the States should develop their own national transition plan, containing the work programme, timetable, responsible parties and status of implementation, in order to monitor and report on the progress made in such activities. Additionally, it should also consider detailed information about the activities required for implementation, the means to provide feedback on the progress made through an annual reporting process, which will help administrations to prioritise the required actions and support, and will also help to identify annual assistance requirements of each ICAO Region.

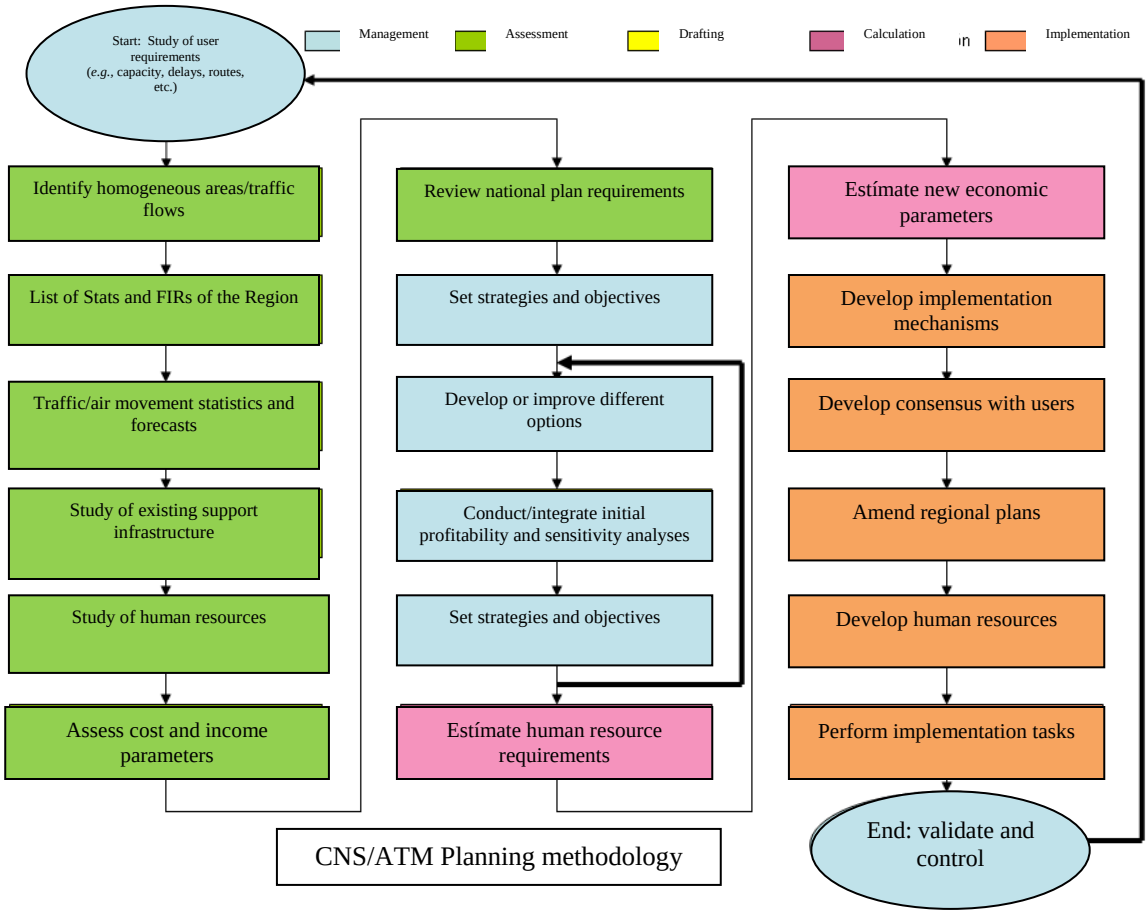

Figure 2. Planning flow diagram

3.3.8 The development of work programmes is based on the experience gained and lessons learned during the previous cycle of the CNS/ATM implementation process. Consequently, this Implementation Plan is aimed at maintaining a uniform regional harmonisation and improving implementation efficiency, taking advantage of infrastructure capacity and existing regional applications.

3.4 Planning Tools

3.4.1 This Implementation Plan will be supported by the planning tools of the Global Plan, which will provide the various electronic formats (*e.g.*, software applications, planning documentation, web-based reporting forms, project management tools, etc.), with a view to following up and ensuring coordination of projects, in which GPIs, performance objectives and target implementation dates, as well as timetables and the resulting action plans are defined. As States contemplate the implementation of the initiatives, they may use common programme templates as a basis for establishing performance objectives and implementation target dates, and develop comprehensive timetables and planning activities to meet the work programme associated to global initiatives (GPIs).

3.5 Evolution

3.5.1 The SAM ATM system is based on the provision of integrated services. In order to describe how these services will be provided, Doc. 9854 defines seven components of the ATM operational concept (see Figure 1 of this Plan), together with key conceptual changes. Performance objectives were Relationshiped to the components of the ATM operational concept in a logical manner to ensure that work is aimed at achieving the ATM system described in the operational concept. Thus, the term Components of the ATM Operational Concept used in this Plan refers to the seven components described in the ATM operational concept, namely: airspace organisation and management, aerodrome operations, demand/capacity balancing, traffic synchronisation, conflict management, airspace user operations, and ATM service delivery management.

3.5.2 In all cases, the initiatives must meet the global objectives based on the operational concept. Accordingly, planning and implementation activities start with the implementation of available procedures, processes and capacities. Evolution would then lead to the implementation of emerging procedures, processes, and capacities and, finally, the migration to the ATM system based on the operational concept. Figure 3 shows the evolution of the Global Plan.

Figure 3. Evolution of the Global Plan

3.6 Global Plan Initiatives

3.6.1 In order to achieve the desired ATM system, numerous initiatives will be gradually implemented in the course of several years. These initiatives were established in order to support the planning and implementation of performance objectives in the SAM Region. The set of initiatives contained in this Transition Plan is aimed at facilitating and harmonising the work already underway in the SAM Region, and providing aircraft operators the benefits they need in the short and medium term.

ICAO will continue developing new initiatives, based on the operational concept that will be included in the Global Plan and, consequently, on this Transition Plan.

3.6.2 **Attachment C** to this Plan lists the Global Plan Initiatives (GPIs) that may be taken into account by GREPECAS and the States. In this Transition Plan, the initiatives will be inserted in each of the following chapters, divided by operational area: ATM, CNS, AGA, MET, AIS, SAR, etc. The planning and implementation of each of the performance objectives should shart in the short term and proceed in an evolutionary manner. Long-term initiatives, which are necessary to guide the evolution to a global ATM system as foreseen in the operational concept, will be added to the Global Plan and, consequently, to this Implementation Plan, as they are developed and approved.

Note: The Global Plan lists the objective and the relevant implementation strategy for each initiative.

3.7 **Integration of Initiatives**

3.7.1 GPIs are provided to expedite the planning process, and should not be considered as independent but rather, in many cases, as interrelated tasks. Therefore, initiatives may be integrated and support each other. In fact, integration is one of the objectives of a global ATM system.

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4 Chapter 4: Air Traffic Management (ATM)

4.1 Introduction

4.1.1 According to the Global ATM Operational Concept, the general objective of ATM is to achieve a global, interoperational air traffic management system for all users during all flight phases, that meets the agreed levels of safety, provides optimum operations, is environmental sustainable, and meets national security requirements.

4.1.2 The future system must evolve from the current system in a way that, inasmuch as possible, meets the needs of the users, according to clearly established operational requirements. The reality is that transition and integration are the most difficult institutional issues facing ATM system designers. It is simply impracticable to evolve from one system to the other in phases that last less than several years.

4.1.3 Airspace boundaries and divisions should not restrict the development of the airspace structure. Planning should be coordinated between adjacent areas in order to achieve a seamless airspace, in which the user does not perceive any division. The airspace should be free of operational discontinuities and inconsistencies, and should be organised in such as way as to accommodate the requirements of the different types of users. The transition between areas should be seamless to users at all times.

4.1.4 The planning and implementation of the components of the ATM Operational Concept should include a study of their impact and requirements in terms of human factors.

4.1.5 Some of the benefits that are expected from the implementation of these components are improved safety, reduced operating fuel costs for users, reduced delays and gas emissions, and increased system capacity.

4.1.6 The evolution of air traffic management in the SAM Region has been carefully planned to avoid the degradation of the performance of the existing system. The safety level attained to date must be preserved during the transition, as a minimum, gradually improving air navigation efficiency. Consideration has also been given to avoiding an unnecessary overloading of aircraft with multiple CNS equipment, both existing and new, during the extended transition period.

4.2 General Principles

4.2.1 Unrestricted access to air navigation services listed in this document must be guaranteed to all SAM States.

4.2.2 The need for SAM States to fully comply with national plans, as well as with the standards governing the use of the new systems, is acknowledged.

4.2.3 SAM States must accept the global nature of the ATM Operational Concept and the objective of providing integration mechanisms for its timely implementation.

4.2.4 CNS infrastructure must be carefully planned based on the requirements identified for the appropriate level of air traffic management in the SAM Region.

4.2.5 The new CNS elements shall be gradually introduced, taking into account the benefits to be derived by the ATM community.

4.3 **Analysis of the current situation**

Gaps of the Current ATM System in the SAM Region

4.3.1 The ATM system currently available in the SAM Region presents some gaps, including the following:

a) Incipient implementation of Performance-Based Navigation (PBN) and, in general, absence of airspace management (ASM).
b) The lack of a systematic use of cost-benefit analyses for the implementation of new airspace structures causes difficulties in the definition of air navigation infrastructure implementation priorities, and prevents measuring the benefits obtained by the ATM community.
c) The lack of a policy and procedures for the flexible use of airspace hinders airspace design and management, preventing the implementation of an optimum airspace structure and the use of optimum flight paths.
d) The lack of air traffic flow management (ATFM) in most airspaces of the SAM Region causes congestion in some airspaces and airports, and prevents optimum use of ATC and airport capacity, thus affecting users.
e) The lack of coordination in the provision of the existing CNS/ATM services sometimes generates a duplication of resources and services;
f) The inadequate quality of communication media and language difficulties create problems in the provision of air traffic services. Operations still rely on increasingly congested voice radiocommunications for air-ground exchanges;
g) The lack of an ATS surveillance service in some portions of the airspace of the Regions prevents a harmonised reduction of aircraft spacing, due to the application of different separation criteria in FIR boundaries (with and without ATS surveillance), thus restricting the use of optimum flight profiles;
h) The lack of harmonisation of automated ATM systems in the SAM Region, as well as the scarce sharing of ATS surveillance data, generates discontinuity in ATS services.
i) Limited facilities for real-time exchange of information between ATM, aerodromes and aircraft operators, leading to a poor response to changes made in the operational requirements of users.

4.3.2 The limitations of the current ATM system result in inefficient aircraft operations. These limitations include:

a) The requirement to fly circling patterns in departure and arrival procedures;
b) The exclusion of civil air traffic from the airspace reserved for defence purposes;

c) Routes based on ground radio aids that prevent direct flights between the origin-destination airports and/or city pairs, and also operations at incorrect flight levels and/or speeds that make it difficult for aircraft to maintain optimum flight profiles;
d) Excessive ground and en-route delays related to the system;
e) Insufficient flexibility to properly address disturbances in airline operations caused by meteorological conditions.

4.4 Strategy for the Implementation of Performance Objectives

4.4.1 ATM evolution in the SAM Region has been planned taking into account the GPIs that could be applied in the short and medium term. These will be applied to main international traffic flows identified in homogeneous areas, as well as in the main terminal areas, providing operational benefits to the ATM community. ATM performance objectives, in addition to the requirements for the implementation of ATM improvements, determine the implementation dates of planned improvements, as well as the performance objectives and the main tasks related to GPI implementation.

4.4.2 The planning period considered is 2012 to 2018.

4.4.3 ATS evolution is based on Global Plan Inititiatives applicable to:

a) En-route operations;
b) TMA operations; and
c) Air operations in general

4.4.4 Planning has been based on seven global aspects, as shown in **Attachment D**, and as listed below:

a) En-route airspace optimisation. (SAM PFF 01)
b) TMA airspace structure optimisation. (SAM PFF 02)
c) Implementation of RNP approaches. (SAM PFF 03)
d) Improvements in civil-military coordination and cooperation (SAM PFF 04)
e) Implementation of the new flight plan. (SAM PFF 05)
f) ATFM implementation (SAM PFF 06)
g) Improvement of ATM situational awareness (SAM PFF 07)

4.4.5 It should be noted that the different specialties (CNS, AIS; MET; AGA/AOP; SAR) developed in this Implementation Plan support ATM development and, in turn, constitute an integrated, indivisible system. In particular, this Implementation Plan contains some cross-cutting issues that the States must especially address, namely:

a) Management of ANS personnel competencies (see Chapter 10).
b) Safety management – SMS (see Chapter 11)

4.5 En-Route Operations

4.5.1 The evolution of ATM for en-route operations took into account the main GPIs applicable to the SAM Region and was planned in order to permit optimum airspace management and organisation.

4.5.2 Homogeneous areas and the main continental and oceanic flows were taken into account, and the corresponding ATM evolution table was developed.

PBN Implementation for En-Route Operations

4.5.3 PBN implementation will foster the use of advanced aircraft navigation capabilities, which, combined with the air navigation system infrastructure, will permit airspace optimisation, including the route network. Thus, it will promote an ATS routing environment that meets the needs of airpsace users, reducing the workload of controllers and pilots and aircraft concentration in certain parts of the airspace.

4.5.4 The implementation of PBN for en-route operations will require the establishment of exclusionary airspaces, considering that these would provide the conditions for making the necessary changes to the airspace structure. So as not to exclude a significant number of users, the vertical limits of the airspace where PBN will be implemented shall be examined in depth.

Short Term

4.5.5 Taking into account the low density of air traffic in oceanic airspaces, no significant changes are expected in the existing airspace structure. The only exception will be the implementation of RNP-10 in the region called WATRS, which will provide significant benefits in the CAR Region. In those airspaces where RNP-10 is applied (EUR/SAM Corridor, the Lima-Santiago route and the South Atlantic Random Route System), no short-term changes are expected.

4.5.6 It is expected that RNAV-5 will be implemented in continental airspace where it can be supported by the available CNS infrastructure.

Medium Term

4.5.7 It is expected that RNP-4 will be implemented in the EUR/SAM Corridor and in the Santiago-Lima route segment, using ADS/CPDLC, in order to permit the use of a 30-NM lateral and longitudinal separation. This implementation will depend on the evolution of the aircraft fleet operating in these airspaces.

4.5.8 During this phase, it is expected that RNP-2 will be implemented in selected continental airspaces, using only GNSS, taking into account that the ground infrastructure will not support RNAV applications. It will be necessary to establish a back-up system for GNSS and to develop contingency procedures in case of GNSS failure. The implementation of RNP-2 will facilitate the implementation of PBN in airspaces with no ATS surveillance service. With the exclusive use of GNSS, more information about the GNSS signal will be required.

Situational Awareness and En-Route Data Relationship Applications

4.5.9 The use of ADS-C and CPDLC in oceanic airspaces will foster the necessary conditions for using 30-NM horizontal separation minima in the EUR/SAM Corridor and in the Santiago-Lima route segment. Furthermore, in other oceanic airspaces with less traffic density, ADS-C and CPDLC will provide reliable surveillance and communication media, reducing the workload of controllers and pilots.

4.5.10 In the continental airspace, the use of enhanced surveillance techniques (ADS-B and/or multilateration) will help reduce horizontal separation minima, enhance safety, increase capacity, and improve the cost-effectiveness of flights. The use of other data Relationship applications instead of voice communications will bring significant benefits in terms of safety and pilot and controller workload.

4.5.11 These benefits may be achieved by providing surveillance in areas that lack primary or secondary radar when so warranted by cost-benefit analyses. In airspaces where radar is used, improved surveillande may help enhance the quality and reliability of surveillance information both on the ground and in the air. The States shall conduct a consistent cost-benefit analysis to determine if, when the time comes, PSR and/or SSR systems should be replaced by ADS-B systems or multilateration.

4.5.12 The use of CPDLC in high traffic density continental airspace must be assessed, taking into account that it might not be feasible due to the characteristics of ATC interventions.

4.5.13 The gradual implementation of ATS interfacility data communication (AIDC) will enhance airspace safety and reduce coordination errors between ATS units.

4.5.14 The implementation of ATS surveillance systems and data Relationship applications should take into account the corresponding automation aspects, mainly with respect to the need for harmonisation between the systems applied, with a view to ensuring system interoperability.

4.5.15 Furthermore, the implementation of ATS surveillance systems and data Relationship applications should consider ATM automation tools (minimum safe altitude warning; conflict prediction; conflict alert; conflict resolution advisory; path conformance control; functional integration of ground and airborne systems, etc.). Amongst others, the following applications are identified:

a) TFMS - SYNCHROMAX or similar
b) Surveillance tools to identify the boundaries of the airspace sector
c) Use of A-SMGC at specific aerodromes, as required
d) Availability of SIGMET in graphical format
e) Dissemination of AIS/NOTAMs.

4.6 TMA Operations

4.6.1 The evolution of air traffic management in terminal areas shall be harmonised with the evolution of ATM for en-route operations, providing for a harmonious and integrated ATM system.

4.6.2 The evolution of ATM for TMA operations took into account the combination of different GPIs applicable to the SAM Region, and was planned so as to permit an optimum airspace management and organisation.

4.6.3 The table on TMA structure optimisation combined GPIs 5, 10, 11 and 12, taking into account that they are all related to the optimisation of the TMA airspace structure through the use of approach procedures, SIDs, STARs, based on RNAV and RNP, the application of TMA design and management techniques, and the functional integration of ground and airborne systems.

4.6.4 The table on situational awareness and implementation of data Relationship applications combined GPIs 9 and 17, taking into account the close relationship between the implementation of enhanced surveillance techniques (ADS-B and/or MLAT) and the use of data Relationship applications.

4.6.5 There are many factors that should be taken into account when planning the requirements for a TMA air navigation service infrastructure. In addition to traffic volume, consideration should be given to other factors, such as: number and location of aerodromes, traffic characteristics, terrain, meteorological conditions, etc. Therefore, the States should analyse each particular TMA and determine, in coordination with the users, the requirements for the implementation of the corresponding air navigation services.

TMA Structure Optimisation

4.6.6 TMA airspace structure optimisation will be achieved through the following measures:

a) PBN implementation, which includes the implementation of SIDs and STARs with RNP and RNAV, and RNP approach procedures.
b) The functional integration of ground and airborne systems.
c) The use of improved design and management techniques.

Implementation of PBN for TMA Operations

4.6.7 TMA operations have specific characteristics, taking into account the separation minima applicable between aircraft, and between aircraft and obstacles. This also involves the diversity of aircraft, including low-performance aircraft that carry out arrival and departure procedures on the same path as, or close to the paths of, high-performance aircraft.

4.6.8 In this sense, the States shall develop their own national TMA PBN implementation plans, based on the CAR/SAM PBN Roadmap. They shall seek harmonisation of aircraft separation criteria and the applicable RNAV and/or RNP criteria, in order to avoid the need for multiple approvals for intra- and inter-regional operations.

4.6.9 The efficiency of TMA operations in a PBN environment depends on aerodrome design and management (GPI 13) and runway operations (GPI 14), taking into account that any air traffic flow increase in TMA operations shall be absorbed by airport infrastructure.

Short Term

4.6.10 It is expected that States will apply RNAV-1 in selected TMAs, in environments with ATS surveillance service and adequate ground-based navigation infrastructure, permitting DME/DME and DME/DME/INS operations. During this phase, operations with equipped and non-equipped aircraft will be permitted, and RNAV-1 operations shall start when an adequate percentage of approved operations is reached.

4.6.11 In environments with no ATS surveillance service and/or where there is no adequate navigation infrastructure on the ground, it is expected that the States will apply RNP-1 in selected TMAs, applying only GNSS, provided there is an adequate percentage of approved aircraft. Nevertheless, operations with approved and non-approved aircraft will be permitted in these TMAs once the corresponding operational benefits are verified. The implementation of overlay procedures and exclusive RNP procedures will depend on air traffic complexity and density.

4.6.12 It is expected that RNP 0.3 (Basic GNSS) approach procedures will be applied in as many airports as possible, mainly in those that have international operations, maintaining conventional approach procedures for non-equipped aircraft.

4.6.13 It is expected that RNP with approval required approach procedures (RNP AR) will be applied at airports in which obvious operational benefits can be obtained, based on the existence of significant obstacles.

Medium Term

4.6.14 During this phase, it is expected that the States will extend the implementation of RNAV or RNP-1 applications to selected TMAs, depending on ground infrastructure and aircraft navigation capacity. At more complex TMAs, RNAV or RNP-1 equipment will be mandatory (exclusionary airspace). At less complex TMAs, equipped and non-equipped aircraft will still be admitted.

4.6.15 During this phase, it is expected that the implementation of RNP 0.3 and RNP AR procedures will be extended to selected airports. It is also expected that the GLS procedure will start to be used to improve the transition between the TMA and approach phases, basically using GNSS for the two phases.

Functional Integration of Ground and Airborne Systems

4.6.16 States are expected to analyse the feasibility of functionally integrating ground and airborne systems, with a view to applying flight procedures that provide the most efficient path during the approach of an aircraft to the destination aerodrome. These procedures shall permit a seamless flight path from the top of descent until the aircraft is stabilised for landing.

4.6.17 The optimisation of TMA efficiency will depend on a maximum use of automation. Likewise, in addition to the continuous descent capacity, aircraft will be increasingly equipped with time of arrival calculation. This capability should be integrated with the ground-based automated systems in order to identify the times of arrival at specific fixes. These schedules should help in the landing sequencing process, allowing aircraft to remain close to their preferred 4D path.

Use of Improved Design and Management Techniques

4.6.18 Airspace planners should apply design techniques for TMA restructuring, with a view to:

a) Validating the proposed airspace structure.

b) Assessing the impact of PBN implementation, including RNAV and/or RNP SID and STAR procedures, and FMS-based arrival procedures, using ATC simulations as needed.

c) Ensuring a favourable cost-benefit ratio.

d) Optimising sectoring so as to make it seamless for users and balanced in terms of workload.

4.6.19 The improvement of TMA management should contemplate the implementation of WGS-84 and of measures for optimising traffic and capacity management, including a collaborative decision-making process involving the tower, the TMA and en-route sectors, while also strategically involving airspace users.

Situational Awareness and Data Relationship Applications for TMA

4.6.20 In addition to the considerations contained in the section on en-route operations, which also apply to TMA operations, the States should consider the following aspects for the implementation of ATS surveillance services and data Relationship applications in the TMA.

4.6.21 The implementation of improved surveillance techniques (ADS-B and/or multilateration) at the TMAs will provide the conditions required for the integration of en-route and TMA operations.

4.6.22 The use of ATS surveillance systems (SSR, ADS-B and/or multilateration) will permit the use of RNAV-based navigation techniques, without RNP, taking into account that surveillance will permit flight monitoring for the detection of any path deviation. Thus, it will be possible to include in TMA operations those users that would not be approved for RNP operations.

4.6.23 The implementation of improved surveillance techniques will facilitate the operation of aircraft not approved for RNAV/RNP, taking into account that the controller will be able to vector them to the final approach.

4.6.24 The implementation of CPDLC in the TMA is not expected, taking into account the characteristics of ATC intervention in these airspaces. However, other data Relationship applications will reduce the workload of controllers and pilots, such as: D-ATIS and digital flight plan clearance (DCL).

4.6.25 It should be noted that TMA users might not be equipped with data Relationship systems, since there is a significant number of low performance aircraft that fly in this airspace and might not be capable of being properly equipped. In that case, procedures must be developed to allow non-equipped aircraft to fly, unless air traffic density warrants the use of exclusionary airspaces.

4.3.8 **Air operations in general**

4.6.26 4.3.8.1 This part of the Plan contains the Global Plan Initiatives applicable to general air operations that cannot be considered as en-route and/or TMA operations.

Flexible Use of Airspace (FUA)

4.6.27 The optimum, balanced and equitable use of airspace by civil and military users, facilitated by strategic coordination and dynamic interaction, will permit the establishment of optimum flight paths, while reducing the operating cost of airspace users.

4.6.28 SAM States should establish policies for temporary or permanent use of restricted airspaces, in order to avoid the adoption of airspace restrictions inasmuch as possible, especially of a permanent nature.

4.6.29 The implementation of the flexible use of airspace should start with an assessment of hazardous, restricted and prohibited airspaces that affect or could affect traffic flow.

4.6.30 The establishment of letters of agreement between ATS and military units or other users for the dynamic and flexible use of airspace should avoid restrictions to the use of airspace, thus accommodating the needs of all airspace users.

4.6.31 In those cases in which airspace restriction is inevitable, the letters of agreement should stipulate that the activation of restricted airspace should not exceed the time required. To that end, it will be necessary to develop paths for dynamic re-routing of aircraft to avoid such airspaces.

4.6.32 The cited paths should be published in the AIP to let users know of the need to take into account such possible deviations in flight planning.

4.6.33 FUA implementation requires convincing the military authorities of the States involved, assuring them that their needs will be met whether or not airspace restrictions are applied. Consequently, seminars/meetings with such authorities will be required to demonstrate the importance of an optimised use of airpsace.

Air Traffic Flow Management - ATFM

4.6.34 The implementation of timely measures for demand/capacity balancing will avoid an overload of the ATM system and will create the conditions for maximising airport and ATC capacity. This should increase significantly airspace capacity and operational efficiency.

4.6.35 Considering that air traffic congestion and saturation problems in the SAM Region are still scarce, the implementation of air traffic flow management measures should be gradual, allowing the States to gain experience, mainly in the calculation and maximisation of ATC and airport capacity.

4.6.36 ATFM implementation in the SAM Region should take into account the objective and principles established in Appendix AL to Item 3 of the GREPECAS/13 meeting, noting that ATFM measures must foster a maximum use of existing capacity without compromising safety. Likewise, it is important to note that ATFM measures must not be used to resolve intrinsic deficiencies of the ATM system.

4.6.37 The CAR/SAM ATFM Operational Concept establishes a simple strategy that should be developed in stages, maximising available capacity and allowing the parties involved to gain sufficient experience.

4.6.38 The experience gained in other Regions and by some SAM States permits the application of basic ATFM procedures at airports, without the immediate need for a centralised ATFM. A centralised ATFM will require extensive studies in order to define operational concepts, system requirements and institutional aspects for ATFM implementation in the SAM Region.

4.6.39 Thus, ATFM in the SAM Region will be implemented by stages, based on the established operational requirements, in keeping with the SAM ATFM Operational Concept.

Centralised ATFM

4.6.40 In order to maximise its efficiency, a centralised ATFM should be responsible for delivering the service in as much airspace as possible, provided it is homogeneous. According to ATFM planning in the CAR and SAM Regions, at least two centralised ATFM will be in place, one for each Region.

4.6.41 During the implementation process, procedures must be developed in a harmonious manner between ATFM units so as not to jeopardise safety. This means establishing a regional and inter-regional strategy to facilitate and harmonise the whole implementation process. Each phase should be implemented based on operational configuarions, descriptive system documents and operational models, in keeping with the established strategy.

4.6.42 In order to conciliate national plans with the CAR/SAM ATFM Regional Plan, civil aviation administrations must take the required measures and closely monitor the regional development of ATFM. They must also prepare an ATFM Implementation Programme that defines implementation requirements and analyses the impact it will have on the national ATC system, both on the airspace and on air traffic services, as well as on airport operations and services. Likewise, they must coordinate as necessary to enable an integral, harmonious and timely regional implementation.

New Flight Plan Format

4.6.43 The new flight plan format is scheduled for implementation by late 2012, in keeping with Amendment N° 1 to Doc. 4444 PANS-ATM. In this sense, the States must coordinate as necessary to interconnect their automated ATC systems of the control centres of the Region, without neglecting the transition stage in which they must make sure that the flight plans in the new format are not rejected due to incompatibility with the aforementioned ATC systems.

4.7. **References:**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM Requirements
- ICAO Document 9828: Eleventh Air Navigation Conference
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Annex 11, Air Traffic Services
- CAR/SAM PBN Roadmap, version 1.4 / July 2009;
- GNSS Manual, Doc 9849 AN/457;
- GREPECAS /14 Final Report (April 2007)
- GREPECAS /15 Final Report (October 2008)

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Chapter 5: Communications, Navigation and Surveillance (CNS)

5.1 Introduction

5.1.1. SAM States must consider the operational requirements contained in Chapter 4 of this Plan when implementing CNS systems.

5.1.2. In view of the new requirements derived from the implementation of the ATM Operational Concept, SAM States shall consider planning improvements to, and the strengthening of, aeronautical communication, navigation and surveillance services, taking into account the global air navigation plan initiatives, as well as new provisions and requirements that need to be implemented in the short and medium term, and the related components of the aforementioned concept (Attachment C).

Communications

5.1.3. Communication systems contemplated in this plan respond to short- and medium-term expectations of the operational requirements in the Region. Accordingly, this plan has taken into account the following communication systems:

a) Aeronautical message handling system (AMHS).
b) ATS interfacility data communication (AIDC).
c) Controller/pilot data Relationship communications (CPDLC).
d) D-ATIS.
d) SAM ATN network.

Navigation

5.1.4. The function of navigation systems is to support en-route, terminal, approach and landing operations and surface movements.

5.1.5. The navigation systems contemplated in this plan respond to short- and medium-term operational requirements of the Region. In this respect, this plan for navigation systems has taken into account the ground navigation infrastructure and the GNSS requirements concerning the operations foreseen in the CAR/SAM PBN Roadmap approved through Conclusion 46 of GREPECAS/14.

Surveillance

5.1.6. The function of surveillance systems is to provide aircraft position information to air traffic service units (ATS)

5.1.7. The surveillance systems contemplated in this plan respond to short- and medium-term operational requirements in the Region. Accordingly, this plan considers the following systems:

a) ADS-B
b) ADS-C
c) MLAT
d) SSR
e) The combination of the aforementioned tools.

5.2. **Analysis of the current situation (2010)**

5.2.1 The current situation of communication, navigation and surveillance services in support of air navigation is described below.

Communications - Aeronautical Fixed Service

5.2.2 AFTN service: The circuits foreseen have been fully implemented. However, and given their average life cycle, maintenance of the existing centres is a significant problem.

5.2.3. ATS speech service: The circuits foreseen have been fully implemented. Circuits are analog and operate without any major problem.

5.2.4. AMHS service: This service has been implemented in most SAM States.

5.2.5. Memoranda of Understanding (MoU) have been drafted for the interconnection of AMHS systems.

Flight plan transfer

5.2.6. *OLDI*: It is available in several SAM States, although only one State uses it within the framework of its own administration.

5.2.7. *AIDC*: It is being implemenated in many States.

Information delivery network

5.2.8. Currently, a satellite digital network (REDDIG) is available in the region to support the required aeronautical fixed services. In order to support the new services foreseen for the short and medium term, the implementation of a new network, that will represent the regional ATN, is required.

Aeronautical Mobile Service

5.2.9. *VHF*: Services have been implemented as indicated in FASID Table CNS 2A, ensuring coverage in most of the selected areas, with problems at low levels in selected airspaces. In the case of terminal areas and aerodromes, many facilities do not follow the recommendation of having different frequencies for APP and TWR services. The *PDC* service has not been implemented at the level required.

5.2.10. *HF*: Although required in FASID Tables CNS 2 A and 2B, the HF service is not being operationally used in many States of the Region. It is mainly provided at some States that have oceanic areas in their FIRs.

5.2.11. ATIS: Implemented according to Table CNS 2A, but in an insufficient number. Use is made of conventional audio recorders and analog VHF transmitters.

5.2.12. *VDL / CPDLC*: Not yet implemented en-route/continental area or terminal area/aerodromes.

5.2.13. *VDL/PDC*: Implemented in very few airports for terminal area/aerodrome.

5.2.14. HFDL / CPDLC: Application for en-route/oceanic area that has not yet been implemented.

5.2.15. Satellite/CPDLC: Service implemented in some oceanic FIRs for FANS-equipped aircraft.

5.2.16 D-ATIS: Implemented in very few airports.

Navigation

5.2.17. Radio aids: All conventional radio navigation aid systems (NDB, VOR, DME and ILS) have been implemented and fully installed pursuant to Table CNS 3 (radio navigation aids). Regarding NDBs, a deactivation process is underway, starting with those stations where the NDB is installed next to a VOR/DME.

5.2.18. ABAS is being implemented in selected airspaces of the Region for en-route, terminal area and NPA operations.

Surveillance

5.2.19. Radar systems: Conventional surveillance systems (PSR and SSR) have been implemented and installed almost entirely in the SAM Region according to Table CNS 4 A (surveillance system). The surveillance systems specified in this table cover most of the terminal areas of the States in the Region. However, not all the routes in the Region are covered.

5.2.20. Radar data exchange: It only exists in very few States of the Region.

5.2.21. ADS-B and MLAT: No services have been enabled to date.

5.2.22. ADS-C: Service provided by some oceanic FIRs, with FANS-equipped aircraft.

5.3 **Strategy for the implementation of performance objectives**

5.3.1 CNS implementation shall be based on a harmonised strategy for the SAM Region, with action plans and consistent timetables, taking into account operational requirements and the corresponding cost-benefit analyses, comparing the current structure with the improvements to be achieved when the new systems are implemented. Consideration should also be given to analysing the existence of two or more technologies to meet the same operational requirement.

5.3.2. The period considered for this planning is from 2012 to 2018.

5.3.3 Planning has been based on four global aspects, as shown in **Attachment D**, and as listed below:

- Improvements to the aeronautical fixed service in the SAM Region (SAM PFF 08)
- Improvements to the aeronautical mobile service in the SAM Region (SAM PFF 09)
- Improvements to the navigation systems in the SAM Region (SAM PFF 10)
- Improvements to the air surveillance service in the SAM Region (SAM PFF 11)

5.3.4. A cross-cutting issue is the management of ANS personnel competencies (SAM PFF 24). In this sense, States must pay special attention to meet ICAO requirements (see Chapter 10) and, of special interest in this chapter, the management of CNS personnel competencies.

Communications

Improvements to the Aeronautical Fixed Service

5.3.5 AMHS: During this period, it is expected that AMHS systems will be implemented in those States that still have an AFTN system in place. Likewise, during that period, it is expected that each one of the AMHS systems installed will be interconnected to its respective AMHS systems, as specified in FASID Table CNS 1Bb.

5.3.6. Communication services for the centralised ATFM: States must make the necessary efforts to implement communication services that effectively support ATFM.

5.3.7 AIDC: The States must make efforts to install automated systems in all their ACCs, with AIDC capability, and use them for the automatic transfer of flight plans between adjacent ACCs.

5.3.8. Improvement of the regional ATN network: In order to implement all the new services in a harmonised manner, the current Aeronautical Telecommunication Network (REDDIG) requires improvements regarding its technological platform, communication protocols, and an increase in capacity for the delivery of information. To this end, it is expected that, during the cited period, a new ATN network will be available to support all the existing services as well as those foreseen. During this period, a study on the optimum network configuration for the region will be conducted and, once approved, it will start being implemented.

Improvements to the Aeronautical Mobile Service

5.3.9. VHF: States must ensure coverage of continental VHF communications for lower flight levels when so required by the operations. Likewise, separate VHF channels must be implemented for TWR and APP services in the terminal area.

5.3.10. HF: The HF service must be maintained in keeping with the requirements listed in Table CNS 2B, “HF network designators for CAR/SAM aeronautical stations”.

5.3.11. CPDLC: States that have oceanic areas in their FIRs must make efforts for the provision of CPDLC services in the corresponding ACCs (HFDL or satellite). Likewise, for continental areas, the States must consider replacing their existing VHF equipment with VDL Mode 2 equipment.

5.3.12. DATIS: The States must start providing DATIS services to replace similar conventional services or where they do not exist.

5.3.13. Protection of the radio frequency spectrum: The States must make the necessary efforts to ensure the protection and proper use of the radio frequency spectrum assigned to aviation for radiocommunication services.

Navigation

Improvements to Navigation Systems

5.3.14. NDB: States must continue with the NDB phase-out plan, as defined by GREPECAS/14 (April 2007). It is estimated that, during the period defined in the plan, most NDB will be deactivated.

5.3.15. VOR/DME: During the period defined in the plan, it is felt that, as part of the transition to the GNSS, VOR/DME systems must be maintained in selected TMAs, gradually starting the deactivation of en-route VOR systems.

5.3.16. ILS: Likewise, it is foreseen that, within the planning period, ILS systems will remain operative.

5.3.17. GLS: Approaches based on CATI GLS will begin at airports that have an operational demand that warrants them.

5.3.18. Flight trial support systems: The States must consider modernising their in-flight and ground trial elements so as to be prepared for a GNSS environment.

5.3.19. Protection of the radio frequency spectrum: The States must make the necessary efforts to ensure protection and proper use of the radio frequency spectrum assigned to aviation for radionavigation services.

Surveillance

Improvements to the Air Surveillance Service

5.3.20. ADS-B and MLAT: The main means of surveillance will continue to be collaborative surveillance in the form of SSR radars, extensively used in TMA and en-route services, and Mode S in high-density TMAs. The use of ADS-B (ES Mode S receivers) and MLAT will start providing en-route and terminal area surveillance as required, strengthening surveillance in areas covered by SSR Modes A/C and S. ADS-B (ES Mode S) will be gradually implemented on the ground to cover en-route and terminal areas.

5.3.21. A-SMGCS: It is foreseen that surface movevement guidance and control systems A-SMGCS will be implemented at airports with a high level of complexity and traffic. A prior study will need to be conducted to identify what system level is required at the aerodrome.

5.3.22. ADS-C: All States responsible of an oceanic FIR shall make operational use of ADS-C surveillance.

5.3.23. Protection of the radio frequency spectrum: The States must make the necessary efforts to ensure protection and proper use of the radio frequency spectrum assigned to aviation for air surveillance services.

5.4. **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM Requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Annex 10, Volumes I to V
- CAR/SAM PBN Roadmap, version 1.4 / July 2009;
- GNSS Manual, Doc 9849 AN/457;
- GREPECAS /14 final report (April 2007)
- Guidelines for the transition to satellite navigation systems in the CAR/SAM Regions (Appendix H to Document 8733);
- Strategies for the introduction and application of non-visual aids in approach, landing and departure in the CAR/SAM Regions (Appendix I to Document 8733);
- Strategy for the evolution of air navigation systems in the CAR/SAM Regions - First Edition Rev. 2.0 – CNS/ATM/SG/1
- CAR/SAM regional unified surveillance strategy - CNS/ATM/SG/1
- Guidance for improving communication, navigation and surveillance systems to meet short- and medium-term operational requirements for en-route and terminal area operations - Project RLA/06/901- October 2008
- 37th Session of the Assembly, Working Paper A37-WP/ 64: Report on outcomes of initiatives regarding Next Generation Of Aviation Professionals.

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Chapter 6: Meteorology

6.1 Introduction

6.1.1 The global ATM operational concept represents the vision of ICAO for a globally integrated, harmonised and interoperational ATM system. The purpose of the ATM operational concept is to achieve a globally interoperational ATM system for all users during all flight phases that meets the agreed levels of safety, provides cost-effective operations, is environmentally sustainable, and meets national security requirements. The development of new tecnologies for both ATS and airborne systems will significantly expedite the improvement and expansion of the ATS currently provided to aircraft operators. This process will undoubtedly require additional meteorological support for ATS and will affect coordination between ATS and meteorological authorities and their respective operational units.

6.1.2 The provision of meteorological information will be an integral function of the ATM system. Information will be adjusted to accommodate ATM requirements in terms of content, format and timing. The main benefits of meteorological information for the ATM system are related to the following:

a) A more precise and timely meteorological information will optimise flight path planning and prediction, thus enhancing the safety and efficiency of the ATM system;
b) The greater availability of meteorological information shared on board the aircraft will help to perfect the preferred path in real time;
c) A better identification, prediction and display of meteorological conditions will permit to address their effects more efficiently, thus enhancing safety and flexibility; for example, precise and timely information on the need for a deviation or re-routing will be available;
d) Improved aerodrome reports and forecasts will facilitate the optimum use of available aerodrome capacity;
e) The greater availability of meteorological information (special air-reports) from airborne meteorological sensors will contribute to improve meteorological forecasts and the display of such information in real time; and
f) Meteorological information will contribute to minimise the environmental impact on air traffic.

6.1.3 In view of the new requirements derived from the implementation of the ATM Operational Concept, SAM States shall consider the planning of improvements and strengthening of aeronautical meteorological services, taking into account the global air navigation plan initiatives, as well as new short- and medium-term implementation provisions and requirements, and the related components of the aforementioned concept (Attachment C).

6.1.4 Improvements to meteorological services imply compliance with ICAO standards in terms of facilities and competent meteorological personnel, and are essential to effectively support ATM for decision-making, flight path optimisation and avoiding unnecessary airspace closures.

6.1.5 Performance management will be an important part of meteorological information quality assurance.

6.2 Analysis of the current situation

6.2.1 SAM States provide an aeronautical meteorological service that has been improving in recent years. Meteorological data automation processes are in a very advanced phase at the aerodromes of the Region. Unfortunately, in most States, the installation of automatic meteorological stations has not resulted in a better service because of insufficient use of the data generated (for example, the non-inclusion of RVRs in METARs or SPECIs). An improvement in the infrastructure of aeronautical meteorological offices and in the meteorological watch offices has also been noted, but improvements are still needed in these units to support the surveillance of meteorological conditions in their area of responsibility so that they can improve the quality of aeronautical meteorological forecasts.

6.2.2 The lack of compliance with ICAO and WMO (World Meteorological Organization) standards and recommendations referred to personnel involved in aerodrome MET units is a concern in most States of the Region.

6.2.3 The establishment of an appropriate quality management system in aeronautical meteorological services (MET/QMS) is fundamental for the improvement of the meteorological service in support of aeronautical activities in general and ATM in particular. In order to implement MET/QMS in the SAM Region, the commitment of the administrations and/or meteorological authorities and of the necessary resources is absolutely necessary; otherwise, any effort by ICAO will be useless.

6.3 Strategy for the implementation of performance objectives

6.3.1 Planning of meteorological systems in support of ATM has been done taking into account current MET deficiencies identified in the Region by the ICAO South American Regional Office, the work programmes of the different ICAO panels and operational groups (IVATF, IAWVOPSG, AWOS, METWSG, SADISOPSG, WAFSOPSG), changes introduced to SARPS, and the provisions contained in Doc. 9750 - *Global Air Navigation Plan*.

6.3.2 Planning has been based on four main axes, as shown in Attachment D, and as listed below:

- Implementation of the MET service quality management system. (SAM PFF 12)
- Improvements in MET facilities. (SAM PFF 13)
- Improvements in the implementation of the international airways volcano watch (IAVW), in the surveillance of the accidental release of radioactive material, and in the issuance of SIGMETs. (SAM PFF 14)
- Improvements in OPMET data exchange; and implementation and follow-up of the evolution of the WAFS (SAM PFF 15).

6.3.3. The management of personnel competencies (SAM PFF 24) and, in some States, the designation of meteorologists and aeronautical meteorology technicians to meet ICAO requirements (see Chapter 10) are cross-cutting issues.

Implementation of the MET Service Quality Management System

6.3.4 The implementation of QMS in MET services will ensure the quality of data and services provided by the aerodrome meteorological units. As a first step towards the achievement of this goal, the development and validation of a QMS Implementation Guide will be of vital importance. With this guide at the disposal of the States, an effective QMS implementation planning should begin. This implementation would require concrete actions by the States.

Improvements in MET Facilities

6.3.5. One of the first consequences of QMS implementation is the improvement of MET facilities. The provision of the appropriate infrastructure to ensure the quality of the meteorological data generated at the aerodrome is of vital importance. Immediate access to real-time global meteorological information would be achieved through the installation of automatic weather stations (AWOS) equipped with RVR sensors and cloud distance meter, in particular, at the aerodromes listed in the AOP Table of the CAR/SAM FASID. A MET equipment inspection and preventive maintenance programme would help to ensure a continuous operation. With respect to Aeronautical Meteorological Offices (AMOs) and Meteorological Watch Offices (MWOs), consideration should be given to a plan to strengthen them and thus improve FIR surveillance. This plan, in addition to personnel competence management, must include, as applicable, the provision of the equipment necessary for the personnel to fully meet their responsibilities.

Improvements in the Implementation of the International Airways Volcano Watch (IAVW), the Surveillance of the Accidental Release of Radioactive Material, and the Issuance of SIGMETs

6.3.6. The implementation of the MET-QMS in conjunction with the improvements to MET facilities should pave the way to a substantial improvement in weather watch, the timely development of OPMET meteorological messages, and their proper coding. An improvement in this field would be the appropriate implementation of the International Airways Volcano Watch and the adoption of steps for the surveillance of the release of radioactive material, in addition to continued monitoring of severe phenomena. The States should ensure the existence, knowledge, and proper use of all the documents related to the responsibility of each institution involved and the units affected in case of volcanic activity, deposition of volcanic ash, or accidental release of radioactive material. Regarding this last point (radioactive material), even in the absence of adequate information and documentation on this matter, it is included in this document in keeping with the provisions of Annex 3 and the future work of the IAVW.

Improvements in OPMET Data Exchange; and Implementation and Follow-up to WAFS Evolution

6.3.7 The timely preparation of OPMET messages and their proper coding, as well as the implementation of the new WAFS products and the evolution of the WAFS will help in the decision-making by operators and airspace users, as well as in aerodrome operations. States should adopt contingency measures for the dissemination of OPMET messages for those cases in which conventional communication systems are disrupted. In conjunction with COM units, the MET authority should plan the coding of OPMET messages in XML format, the implementation of upRelationships from the AWOS MWO(s) to the aircraft, the dissemination of SIGMET(s) in graphical format, and the updating of systems that receive WAFS products so that they may be compatible with future operational environments.

6.3.8 Regional planning will consist of two phases. The first one is related to MET-QMS implementation and the second is related to the evolution of ATM requirements. These phases will include roadmaps listing the activities that the States must carry out. The first phase is to be completed by **12 November 2012**, when the ICAO contracting States will make sure that the meteorological authority has established and implemented a duly-organised quality system that includes procedures, processes and resources for ensuring the quality of meteorological information for aeronautical users in support of international civil aviation.

6.4 References

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Annex 3 - Meteorological service for international air navigation.
- ICAO Document 8896: Manual of aeronautical meteorological practice
- ICAO Document 9377: Manual on coordination between air traffic services, aeronautical information services and aeronautical meteorological services
- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 9854: Global air traffic management operational concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- WMO Bulletin No. 258, Supplement No. 1 – Training and qualification requirements for aeronautical meteorological personnel
- *http://www2.icao.int/en/anb/met-aim/met/sadisopsg/Pages/default.aspx*
- *http://www.metoffice.gov.uk/sadis/index.html*
- *http://www2.icao.int/en/anb/met-aim/met/wafsopsg/Pages/default.aspx*
- *http://www2.icao.int/en/anb/met-aim/met/metwsg/Pages/HomePage.aspx*
- *http://www2.icao.int/en/anb/met-aim/met/iavwopsg/Pages/HomePage.aspx*
- *http://www2.icao.int/en/anb/met-aim/met/ivatf*

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Chapter 7: Search and Rescue (SAR) Services

7.1 Introduction

7.1.1 The mission of SAR services is to find people in danger, help them and transport them to a safe place to receive proper care. The key for organising and having successful SAR services lies in top management, whose mission is to perform managerial tasks that will result in improved SAR operations, that is, the availability of an organised, trained and available SAR system capable of effectively helping people in danger.

7.1.2 The availability of SAR resources is often a critical initial capacity for responding and providing assistance to safe lives during the first stages of a disaster caused by natural causes or by the aviation activity *per se*. Accordingly, SAR services are sometimes part of an emergency management system.

7.1.3 SAR activities are an excellent means to encourage cooperation among States and organisations at the local, national and international level, since they involve missions that rarely create conflicting situations. Cooperation in this field may also lead to cooperation in other spheres. Such activities protect goods that may have a high value, which contributes to justify the existence of SAR services.

7.1.4 Close coordination between civil and military organisations is essential. National SAR coordination committees are a means for the establishment of such cooperation. The legislation should provide for the use of military and other public resources in support of search and rescue.

7.2 Analysis of the current situation

SAR requirements

7.2.1 The basic requirements for the establishment of an effective SAR system are:

a) The establishment of a regional framework concerning the need for availability of the SAR services that have jurisdiction over the different Search and Rescue Regions of the SAM Region;
b) Measures for using the available resources and procuring others as necessary;
c) The designation of the geographical areas of responsibility of the associated RCCs and RSCs;
d) Staffing, training and other personnel resources to manage and maintain the system in operation;
e) The appropriate and available means of communication; and
f) Agreements, plans, and related documents aimed at meeting the objectives and defining work relationships.

7.2.2 The periodic assessment of SAR requirements at regional level is very important for planning SAR resources and personnel in a coordinated manner, taking into account the respective SAR regions of the SAM States.

7.2.3 These updated and regionally harmonised requirements include, *inter alia*, the timely establishment of agreements between the different SAR services of SAM States for the provision of a regional search and rescue service, in keeping with the characteristics and needs of the aircraft fleet operating in the Region**.**

7.3 **Implementation strategy of performance objectives**

Risk management in practice

7.3.1 The use of risk management techniques gives some order to the uncertainty surrounding SAR organisations. It is an extremely useful tool for determining future work priorities and improving the capacity to meet the objective of the organisation, which is to find people in distress and take them to a safe location.

7.3.2 Risk analysis is a useful tool for those responsible for SAR organisations, since it can help in the assignment of resources that have priority for the organisation, and its results may be used to raise awareness amongst independent parties about the importance of search and rescue. SAR organisations should conduct a risk analysis and use the information thus obtained to increase their possibilities of saving lives.

Quality management

7.3.3 Initiatives aimed at improving the quality of SAR services will substantially improve the results and reduce costs, mainly by eliminating the causes of unnecessary expenditures. These are important objectives for any administration, regardless of the volume of resources available.

7.3.4 The top management of a SAR system that assigns importance to quality tends to conduct more activities, make fewer mistakes, enjoy good reputation, and attract the resources necessary for the growth and better performance of the system.

7.3.5 In contrast, SAR organisations that do not pay attention to quality are subject to mistakes that may result in a reduced number of lives saved, the adoption of wrong or late operational decisions that create confusion, accidents and equipment failures, a deficient or inadequate use of resources, and unnecessary expenditure of economic resources.

7.3.6 Given the increasing air traffic activity and the use of large aircraft with a large passenger capacity, and its relationship with the responsibility of SAM States to protect human lives, it is important for SAR top management to develop a quality assurance programme for search and rescue (SAR) services, to be used as a quality management tool to ensure compliance with the objective of the national SAR plan of each SAM State.

7.3.7 This will also contribute to the provision of effective SAR services within the respective areas of SAR responsibility of each of these States, so as to foresee and particularly meet the many needs that would result from an accident with a large aircraft.

Competence of the search and rescue personnel

Training

7.3.8 Training is essential for operations and safety. The purpose of the SAR system is to save those who are in danger, and also to use training to reduce risks for the personnel and their means, which are very valuable. The training of personnel to conduct sound risk assessments will help ensure that the professionals who have received such training and the valuable means continue to be available for future operations.

Qualification

7.3.9 The purpose of the qualification is to validate the capacity of individuals to carry out certain tasks. They must demonstrate that they have a minimum level of knowledge and skills. This validation may be conducted in a specific position, through maintenance activities by a given team, or as a member of a group within a unit.

7.3.10 Qualification methods demonstrate the capacity of an individual to carry out concrete tasks. A qualification programme will cover the essential knowledge required to perform the functions in a given position and will test individuals in the use of the systems that they will have to manage or maintain.

Certification

7.3.11 The term certification is used in ICAO and other organisations within the context of authorising the personnel or the means to carry out certain functions. The term is also used to officially leave on record that an individual is duly trained and qualified to perform the tasks entrusted.

7.3.12 Thus, the objective of the certification is to authorise an individual to serve in a given capacity. Certificates should be issued to applicants that meet the conditions required for the service, as well as age, physical fitness, training, qualification, exam and maturity requirements. The certification must be issued in writing before the individual assumes his/her responsibilities in the surveillance service.

7.3.13 Training can only provide knowledge and skills at a basic level. Qualification and certification procedures help to demonstrate that sufficient experience, maturity and good judgment have been achieved. During the qualification process, the individual, upon showing his/her skill, should demonstrate that he/she is physically and mentally fit to be part of a group. Thus, the certification is the official acknowledgment by the organisation that it trusts the individual in the use of such skill.

7.3.14 The specific certification requirements vary according to the type of work location (ship, aircraft or RCC). The applicant to the title or certification may be assigned to a SAR specialist, who will observe how he/she carries out each of the tasks, and who will attest to his/her competence. A detailed knowledge of the geographical area of operation shall also be demonstrated. Certain tasks may require a periodic certification renewal.

7.3.15 Those responsible for managing the SAR service in general perform administrative functions; consequently, it is advisable that they participate in training courses on the following topics:

a) Planning;
b) Organisation;
c) Personnel;
d) Budget; and
e) Performance assessment

7.3.16 The use of means and personnel in search and rescue operations under severe weather or in rough terrain will require a special ability that is not generally learned through normal courses. Consequently, consideration should be given to the conduction of specialised courses for personnel training.

7.4 References

- ICAO Annex 12, Search and Rescue Services
- IMO/ICAO Doc 9731 – International Manual of Search and Rescue Aeronautical and Maritime Services

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Chapter 8: Aeronautical Information Services

8.1 Introduction

8.1.1 SAM States must consider the operational requirements of Chapter 4 of this Plan when implementing aeronautical information services.

8.1.2 In view of the new requirements derived from the implementation of the ATM Operational Concept, SAM States shall consider planning improvements to, and the strengthening of, aeronautical information services, taking into account the initiatives of the Global Air Navigation Plan, as well as new provisions and requirements for short and medium-term implementation, and the related components of the aforementioned concept (Attachment C).

8.2 Analysis of the current situation

8.2.1 Both ground and in-flight operational requirements introduced the need for new AIS requirements for the provision of information in electronic format, while assuring its quality, integrity, and timely distribution. In order to meet these new requirements, the aeronautical information service, with its product-oriented activities, will evolve towards a broader concept, known as Aeronautical Information Management, whose activities will be data-oriented.

8.2.2 In order to facilitate coordination, improve efficiency and safety, and ensure that the different members of the ATM community have the same information for collaborative decision-making, it is essential to have both statistical and dynamic information in one same display. Electronic information containing sets of geographical data will improve situational awareness of pilots during all flight phases, through its use on airborne equipment. The same information must be provided, for example: in different ATC positions, pre-flight planning units, flight planning departments of airlines or general aviation users. Electronic information must be adaptable, customising its presentation in a way that meets the requirements of all users of the ATM community and is best suited to their respective applications.

8.2.3 Standard models will be used for the establishment of integrated terrain and obstacle aeronautical information databases. Likewise, common specifications will be adopted for the digital display of such data, such as the electronic Aeronautical Information Publication (eAIP), and electronic aeronautical and aerodrome charts available on board.

8.2.4 Data exchange will be carried out using a standard model that displays static information (for example, that contained in the AIP) and also includes dynamic information (NOTAM). To this end, it is necessary to create a restructured NOTAM that permits its full digital processing. This new format is known as digital NOTAM.

8.2.5 Collaborative decision-making processes will require the combination of AIM and MET data products. To this end, meteorological data must be available in a format similar to other aeronautical data. Therefore, standardisation and implementation activities that help to find solutions for the interoperability of MET and AIS data products must be included.

8.3 **Strategy for the implementation of performance objectives**

8.3.1 Planning has been based on two main axes, which are shown in Attachment D, and listed below:

- Quality, integrity and availability of electronic aeronautical information (SAM PFF 17)
- Transition to the provision of electronic aeronautical information (SAM PFF 18)

Quality, Integrity and Availability of Electronic Aeronautical Information

8.3.2 A prerequisite for the transition to AIM is the establishment of SARPs on quality assurance, integrity and timely availability of aeronautical information.

Aeronautical information regulation and control (AIRAC)

8.3.3 The efficacy of aeronautical information management (AIM) will largely depend on an adequate distribution and synchronisation of data. This will require better response times, which will only be possible if at least current requirements are met.

Quality management system (QMS)

8.3.4 The use of data sets on airborne equipment (FMS), automated systems for ATC, ground proximity warning systems (GPWS) and other systems related to an improved situational awareness make it absolutely necessary to implement processes to ensure the quality and integrity of the aforementioned data. These processes should be organised in a quality management system (QMS) applicable to all activities performed by the AIS.

8.3.5 The quality management system should be consistent with the ISO 9000 series and be certified by an accredited certification body. This certification is sufficient measure of compliance.

Monitoring of integrity in the data supply chain

8.3.6. Quality management systems should evolve until they are applied to all the data supply chain, starting at their origin.

8.3.7 In order to guarantee raw data integrity, service level agremeents (SLA) must be established with the originators.

8.3.8 These SLAs will serve as a regulatory framework for the provision of data by the originators, and will contain details, *inter alia*, on: services to be provided, related indicators, acceptable and unacceptable levels of service, commitments and responsibilities of the parties, action to be taken in face of given events or circumstances, agreed data transmission formats, etc.

8.3.9 The SLAs are also a tool for measuring service performance, through the use of key performance indicators (KPIs).

Use of WGS-84

8.3.10 GNSS implementation requires the use of a common geodetic reference system. The SARPs determine that this common reference system must be WGS-84.

8.3.11 Consequently, the objective should be to express all coordinates in the WGS-84 reference system in an effective and verifiable manner. This requirement will also apply to future data products.

Transition to the Provision of Electronic Aeronautical Information

8.3.12 The transition to aeronautical information management (AIM) implies--as already stated--a data-oriented product. This transition to a digital format must be based on standard models and products that permit the exchange at a global level.

8.3.13 Based on this standardisation, the implementation of products and models will be done in a coordinated manner, at a global level, and in keeping with SARP updates resulting from new specifications.

Aeronautical Information Conceptual Model

8.3.14 A conceptual model defines the semantics of aeronautical information in terms of common data structures, and takes into account the new requirements derived from the ATM Operational Concept.

8.3.15 The implementation of a conceptual model fosters interoperability and should serve as a reference in the design of the database specified in 8.3.16, 8.3.17, 8.3.18 and 8.3.19

Integrated Aeronautical Information Database

8.3.16 Use will be made of an integrated aeronautical information database that integrates the digital aeronautical data of a State or Region and will serve to generate AIM products or services.

8.3.17. Use of database engines with spatial characteristics (geo-database) is highly advisable, since it enables data processing in geographical information systems (GIS).

8.3.18. Although it is not necessary for the design of these databases to be identical in all States or Regions, their modelling according to a common conceptual model (see 8.3.14 and 8.3.15) would facilitate the subsequent exchange of data.

8.3.19. Database management may be carried out by a State or through regional initiatives.

Aeronautial Information Exchange Model (AIXM)

8.3.20 An exchange model is essential for interoperability, since it establishes an aeronautical data syntax for names and characteristics.

8.3.21 It will be established based on open standards (XML, GML), facilitating their incorporation into pre-existing or future systems.

8.3.22 It shall contemplate the exchange of dynamic information (NOTAM), enabling the extension of the traditional NOTAM format to give way to the digital NOTAM digital.

Terrain and obstacle database (e-TOD)

8.3.23 Ground proximity warning systems (GPWS), like the GIS-based procedure design and optimisation tools, require the electronic availability of high-quality terrain and obstacle data products.

8.3.24 To respond to this need, terrain and obstacle databases will be established according to common definitions that will be incorporated into the SARPs.

Electronic Aeronautical Information Publication (eAIP)

8.3.25 The eAIP must be considered as the evolution from the traditional paper-based AIP to the digital medium. The electronic version will have two formats: one will be suited for printing and the other will be accessible only through web browsers.

8.3.26 The eAIP must maintain a standard format, just like its predecessor, facilitating the exchange and preventing the proliferation of different presentations.

Electronic mapping and aerodrome mapping

8.3.27 Taking into account the technology available on board and in order to improve situational awareness, new digital mapping products suited to these devices will be established.

8.3.28 The use of the exchange model will allow these products to incorporate dynamic information in real time.

AIS-MET interoperability

8.3.29 Once an exchange model has been established for AIM and a similar one for MET, it will be necessary to implement processes that promote AIS-MET interoperability and thus permit information integration.

8.4 References

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Annex 15 - Aeronautical Information Service”
- ICAO Annex 4 “Aeronautical Charts”
- ICAO Document 8126 “Aeronautical Information Services Manual”
- ICAO Document 8697 “Aeronautical Chart Manual”
- ICAO Document 9674 “World Geodetic System (WGS-84) Manual”.
- “AIS-AIM Transition Roadmap” – ICAO

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Chapter 9: Aerodromes and Ground Aids / Aerodrome Operational Planning (AGA/AOP)

9.1 Introduction

9.1.1 SAM States must take into account the operational requirements listed in Chapter 4 of the Aerodrome Operational Plan, including ground aids.

9.1.2 In view of the new requirements derived from the implementation of the ATM Operational Concept, SAM States shall consider the planning of improvements and strengthening of aerodrome services, taking into account the Global Air Navigation Plan initiatives as well as new provisions and requirements that require implementation in the short and medium term, and the related components of the cited concept (Attachment C).

9.2 Analysis of the current situation

9.2.1. The aerodrome shall manage the increase of TMA operations within an environment of safety. This requires the identification and optimisation of the critical elements inside and outside of the aerodrome that have an impact on this objective.

9.2.2. There is a need to identify aerodromes that are close to operational saturation with respect to these critical elements, as well as the actions required to improve this capacity, based on the identification of these limitations through the use of best practices in the existing infrastructure and, if necessary, in the modified infrastructure.

9.2.3. Other aerodrome operational capacity issues that must be assessed are the penalties applied by the environmental authority to aerodromes, expressed in the limitation of operations, and the use of time slots for noise control and use of the ground. On the other hand, the closure of airports due to adverse weather conditions, conditions external to the operation, and capacity of the installed infrastructure affect or restrict the required optimisation.

9.3 Strategy for the implementation of performance objectives

9.3.1 Planning has been based on main axes, which are shown in Attachment D, as listed below:

a) Quality of aerodrome data (SAM PFF 19)
b) Aerodrome certification (SAM PFF 20)
c) Safe aerodrome operations that to not meet ICAO SARPs (certification with limitations). (SAM PFF 21)
d) Optimisation of aerodrome capacity (SAM PFF 22)
e) Prevention of runway excursion (SAM PFF 23)

9.3.2. As a result of the assessment of aerodrome capacity factors directly affected by the increase in the flow of operations within the framework of safety management, strategies for achieving AGA/AOP objectives are identified, as summarised in five Performance Framework Formats (PFFs): Aerodrome information quality requirements, aerodrome certification, safe operations at aerodromes that do not meet ICAO SARPs (certificates with limitations), aerodrome capacity optimisation, and runway incursions and excursions.

Quality of Aerodrome Data

9.3.3 In order to achieve more efficient aerodrome operations and reduce the risk of aviation accidents, the quality of aerodrome information must be assured through updates.

9.3.4 The tasks required to attain this perfomance objective includes the development of a regional action plan that identifies the need to update the information contained in Document 8733, CAR/SAM Navigaion Plan, Vol. II FASID, Table AOP1. The updating of information will contribute to a reduction of air navigation deficiencies in the States, taking into account that many of them result from non-compliance with the information contained in Table AOP1 originally provided by the States. Likewise, it will be necessary to establish letters of agreement with AIM, not only to ensure the quality of aerodrome information, but also to update aerodrome obstacle data in the WGS-84 system through e-TOD.

Aerodrome Certification

9.3.5 The aerodrome certification process in the SAM Region is a prerequisite for improving operational capacity of aerodromes within a safety environment, and requires a provisional certification based on compliance with ICAO SARPs and the subsequent validation of this certification in accordance with the LARs.

9.3.6 Compliance with this PFF requires the development of a strategic plan for aerodrome certification, a regional plan for the certification of aerodromes capable of meeting ICAO SARPs, and based on this certification, an SMS assurance process based on internal audits to the aerodromes (Document 9859). The second phase requires the development of LAR regulations, procedures and documentation, as tools that States can use for the validation of aerodrome certification and its implementation in the SAM Region.

Safe Operations at Aerodromes non-compliant with ICAO SARPs (certification with limitations)

9.3.7 The conditions of part of the aerodrome infrastructure in the SAM Region reveal that some are susceptible of receiving a certification with limitations in the compliance with ICAO SARPs. However, this does not exempt these and other aerodromes in the Region from having guides for their certification under these conditions, and thus aerodrome operations in a safety environment that promotes risk management, self-auditing by the aerodrome, State audits (Document 9859) and ICAO audits.

9.3.8 The foregoing requires a regional plan for the initial identification of these aerodromes in the SAM Region, the development of guides by ICAO for the certification of aerodromes with limitations in the compliance with ICAO SARPs. These guides should include guidance on the conduction of cost-effectiveness/SMS aeronautical studies that encourage States to certify their aerodromes. The implementation of the certification of these aerodromes is also a safety objective of the SAM Region.

Optimisation of Aerodrome Capacity

9.3.9 The capacity obtained through the aforementioned strategies relates to the installed infrastructure and its utilisation, understood as capacity with respect to the required demand. Accordingly, aerodrome capacity must be assessed based on saturation or near saturation under current and expected traffic conditions. Therefore, it is very important for the Region to identify airports that are close to this saturation condition in order to propose the development of manuals that contemplate, as a first objective, capacity improvements in runways, turning apron, taxiways and apron, based on the existing infrastructure and, as a second objective, the implementation of new infrastructure.

9.3.10 Accordingly, it is necessary to assess the aerodromes of the Region that are close to the point of saturation, develop a guide containing runway capacity optimisation procedures that use operational tools such as runway segregation, segmented runways, optimisation of surface movement, and then plan the new infrastructure in harmony with the environment. It is necessary to include letters of operational agreement in this new operational condition, as well as the monitoring of the optimisation of runways and their supplementary systems.

Prevention of Runway Excursions

9.3.11 The safety of aircraft operations with respect to conditions that cause runway excursions, may largely depend on pavement surface conditions, their behaviour under different weather conditions, and their use. Consequently, the identification and management of such conditions to keep them within acceptable levels favour this operational requirement. These characteristics are: friction on paved surfaces covered by snow or ice or water, surface drainage capacity, and rubber contamination.

9.3.12 The foregoing requires the development of a regional action plan for the identification of these runway surface safety requirements and the assurance of an acceptable SMS risk.

9.3.13 Likewise, aerodrome operators must report these operating conditions to users, authorities and providers, as a requirement for ensuring proper dissemination.

9.3.14 The States must monitor the progress of the programme, and this information shall be provided to ICAO in order to contribute to safety measurements.

9.4 **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Annex 14, Standards and Recommended Practices - SARPs.
- ICAO Document 9774: Aerodrome Certification Manual.
- ICAO Document 9157. Aerodrome Design Manual.
- ICAO Document 9859. Safety Management Manual.
- ICAO Document 9184. Airport Planning Manual.
- ICAO Document 9137. Airport Services Manual.
- ICAO Document 9830. Surface Movement Guidance and Control Systems (SMGCS) Manual
- Report of the seventh meeting of the AGA/AOP/SG7 Subgroup, Buenos Aíres, Argentina, 9 to 13 September 2009.

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Chapter 10: Development of Human Resources and Competence Management

10.1 Introduction

10.1.1 In view of the new requirements derived form the implementation of the ATM Operational Concept, SAM States shall consider planning the Development of Human Resources and Competence Management, taking into account the Global Air Navigation Plan Initiatives, new provisions and requirements in the short and medium term, as well as the related components of the cited concept (Attachment C).

10.1.2 A main objective of ATM systems is the creation of a seamless global air navigation system. A continuous navigation environment will require an international team duly prepared to work within this scope. To achieve this, the members of this team must receive a uniform and high-quality level of training.

10.1.3 The proper provison of air navigation services will depend on the management of the competencies of technical and operational personnel, as well as on their availability in sufficient numbers to cover the different services.

10.1.4 In the past, the evolution of aeronautical technologies has been gradual and, to a large extent, Civil Aviation Training Centres (CATCs) and instructors have been able to face the challenges of change, even though they did not always have refined training methodologies and instruments available. However, the new ATM systems are based on many new concepts, and their implementation represents an even bigger challenge.

10.1.5 The introduction of these new conepts within the ATM system will have a big impact on aeronautical personnel, not only on ground personnel but also on the flight crew. That is why competence management is one of the key issues for a successful transition.

10.1.6 As a result of the introduction of the components of the ATM Operational Concept, new aeronautical disciplines will emerge. From the point of view of human resource planning, it will be necessary to redistribute and train personnel.

10.1.7 The planning of personnel competence management for the implementation of the components of the ATM Operational Concept shall take into account the specific requirements of each implementation activity in each of the areas that make up this Document.

10.1.8 The planning of training in the SAM Region shall be done in coordination with CATCs where the required courses would be given.

10.1.9 ICAO has adopted a new training policy that includes a process to support training organisations and courses. This new training policy covers all safety and security aspects and supplements the work of the special team on the new generation of aviation professionals (NGAP). The civil aviation training policy of ICAO permits the implementation of an integral framework that ensures that all training provided by ICAO or third parties is subject to assessment to make sure it complies with the stringest standards concerning the design and development of training courses (EB2010/40).

10.2 **Analysis of the current situation**

10.2.1 The CAR/SAM ANP, within its planning aspects, contemplates human factors and training plans. It recognises that the high level of automation and interdependence of the current system gives rise to several problems related to human factors. The experience gained with human factors indicates that they should be considered as an integral part of any plan for the implementation of new technologies. It also recognises that an important objective of regional planning is the creation of a uniform air navigation system that will require an international team duly prepared to work in that environment.

10.2.2 Similarly, frequent mention is made of the deficiencies in human resource planning and training as a main reason for the lack of implementation of regional air navigation plans. Human resource development challenges will multiply during the period of transition from the current system to the system envisaged in the ATM operational concept. Since the existing and emerging air navigation technologies will work in parallel for some time, civil aviation personnel will have to develop new skills and maintain those necessary for the operation and maintenance of the existing systems. To solve this problem, a collaborative approach should be applied for civil aviation training.

10.2.3 The analysis of the current situation reveals two types of problems: *existing and emerging problems.*

10.2.4 Existing problems include, *inter alia*:

a) Lack of personnel to operate the systems
b) Legal and budgetary limitations of the States
c) High cost of training (initial, specialised, recurrent, and maintenance of personnel qualifications)
d) Personnel with inadequate knowledge of English
e) Insufficient amount of simulators for initial training of personnel
f) Insufficient level of qualification of instructors in the new concepts
g) Trianing organisations inadequately prepared to face the new challenges
h) Inadequate selection of candidates

10.2.5 Emerging problems could be attributed, *inter alia*, to:

a) The need to implement new training methods
b) New competencies as a result of the increased dependence of aviation on real-time digital technologies
c) Increased traffic volume

10.2.6 Currently, the South American Region has a regional mechanism made up by the Directors of Civil Aviation Training Centres, which meets on an annual basis. These events are aimed at analysing human resource planning and training, cooperation amongst training centres, the creation of introductory courses to the new CNS/ATM systems, the need to professionalise training centres in order to face the new demands of the new systems, promote the TRAINAIR programme through the incorporation of new centres into the programme, and the development of courses under this methodology. This mechanism should reflect the new requirements, and establish a programme in keeping with current requirements.

10.3 **Strategies for the implementation of performance objectives**

10.3.1 All the areas involved in ATM have participated in the planning of the development of human resources and training requirements, including operations and airworthiness personnel of the aeronautical authority of each State. The starting point was the absence of a full integration and the need to become aware of the role of each individual within the ATM Operational Concept, taking into account the guidelines of Document 9750 – Global Air Navigation Plan, the Global ATM Operational Concept and other related ICAO documents.

10.3.2 In a first phase, the ICAO SAM Regional office, in cooperation with the States, should develop a roadmap that includes concrete activities to face the challenges of the new concepts, with duly trained and updated personnel.

10.3.3 ICAO programmes concerning the formation of the new generation of aviation professionals (NGAP) must be taken into account, using the results of this panel for planning the courses.

10.3.4 In order to plan competence management for the implementation of the ATM Operational Concept, the Region may use the following strategy to expedite international cooperation for the development of programmes and materials to be used in the courses, and in regional and national seminars and workshops:

a) Prompt identification of training needs and priorities for ANS personnel: Given the considerable amount of training that will be needed to prepare for the new systems, as well as the need to standardise training, it is essential to establish a collaborative plan for the development of the required materials. However, an effective and profitable plan may only be formulated after training needs and priorities have been clearly identified.

b) Coordination and planning of training for ANS personnel at regional level: Effective planning and coordination of the appropriate materials should be done at a regional level. The SAM Region has structures that could be used to fulfil this task.

10.3.5 Through Regional projects, consideration shall be given, in a first phase, to the development of a Guide on the ATM Operational Concept and its supporting systems, in order to train instructors in the new concepts to be implemented.

10.3.6 When planning the courses, it should be assured that programmes on each ATM specialty include basic training in the other areas, so that the personnel will be aware of the work done in other units and of the impact their tasks have on the overall ATM. As a strategy, the planning of personnel competence management shall consider three stages:

a) Basic training: This stage shall include the new concepts of the ATM system, communication systems and all the aspects that will be involved in the operation of air navigation systems.

b) Training for implementation planners: Training is required at the top management level in order to provide decision makers the necessary basic information for planning the implementation of ATM systems. This type of training is required for executive staff responsible for planning ATM systems, as well as for those responsible for planning contributory systems.

c) Task-specific training: The third category of training is the one required for ongoing management, operation and maintenance of systems. This category accounts for most of the training needs and is the most difficult to plan, develop and implement.

10.3.7 Planning has been based on a main axis, which is shown in Attachment D, and listed below:

a) Management of air navigation service personnel competence (SAM PFF 24).

10.3.8 CATCs shall actively accompany the planning and development of update and training courses on the ATM Operational Concept to comply with the roadmap developed by ICAO and the States.

10.4 References

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- ICAO Document 9868: Training (PANS)
- ICAO Document 7192 -AN/857: Training Manual
- Assembly 37Th Session A37-WP/64 “Report on outcomes of initiatives regarding Next Generation of Aviation Professionals”
- WMO Bulletin No. 258, Supplement No. 1 – *Training and qualification requirements for aeronautical meteorological personnel*
- ICAO Electronic Bulletin EB2010/40 of 28 September 2010 “ ICAO Civil Aviation Training Policy”

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Chapter 11: Safety

11.1 Introduction

The Global Aviation Safety Plan

11.1.1 The objective of the Global Aviation Safety Plan (GASP) is to reduce the risk of accidents for civil aviation by providing a common frame of reference for all stakeholders to as to have a more dynamic approach to aviation safety and contribute to the coordination and guidance of global safety policies and initiatives. The first version of the ICAO GASP was prepared in 1997 and was regularly updated until 2005. The 36th Assembly Session, held in October 2007, was presented with an amended GASP, which was subsequently acknowledged in Resolution A36-7.

11.1.2 The cited Resolution A 36-7 urges contracting States and the industry to adopt the principles and objectives contained in the Global Aviation Safety Plan and the Global Aviation Safety Roadmap, and to apply their methodologies in partnership with all stakeholders with a view to reducing the number and rate of aircraft accidents.

Regional Aviation Safety Groups

11.1.3 The Regions are currently resolving safety issues through different mechanisms established by the States themselves and the industry. The Pan-American States created the Regional Aviation Safety Group— Pan-America (RASG-PA) in 2008 in response to Resolution A 36-7. This Group was established as a focal point to ensure harmonisation and coordination of safety efforts aimed at reducing aviation risks in the North American, Central American and Caribbean (NACC) and South American (SAM) Regions, and the promotion, by all the stakeholders, of the implementation of the resulting safety initiatives.

State Safety Programme (SSP)

11.1.4 The introduction in the SARPs of requirements related to the State safety programme (SSP) resulted from the growing recognition that safety management principles impact most of the civil aviation management activities, including regulation, policy-making and safety oversight.

Safety Management System (SMS)

11.1.5 The States will require, as part of the State safety programme, that the air traffic service provider and aerodrome operators implement a safety management system acceptable to the State and that, at least:

a) Identifies safety hazards;
b) Ensures the implementation of the necessary corrective measures to maintain the agreed level of safety efficacy;
c) Provides for ongoing monitoring and periodic assessment of safety efficacy; and
d) Seeks to improve the general status of the safety management system on a continuous basis.

11.1.6 The SMS will clearly define the lines of responsibility for safety within the organisation of the air traffic service provider or aerodrome operator, including the direct safety responsibility of high managerial staff.

11.1.7 When AIS, CNS, MET and/or SAR services are provided under the authority of an ATS provider, the provision of these services will be subject to the requirements established in 11.1.5 and 11.1.6 above.

11.1.8 When AIS, CNS, MET and/or SAR services are fully or partially provided by an entity other than an ATS provider, the requirements established in 11.1.5 and 11.1.6 will apply to those aspects of these services that a have direct operational impact.

11.1.9 Likewise, the State administration must establish mechanisms to ensure the effective supervision of the critical elements of the safety oversight function. Furthermore, it must create mechanisms to ensure that hazard identification and safety risk management by service providers is consistent with the established regulatory controls (requirements, specific operating regulations and implementation policies). These mechanisms include inspections, audits and surveys to ensure that safety risk regulatory controls are properly integrated in the SMS of service providers, that they are implemented as designed, and that they have the expected effect on safety risks.

11.1.8 According to ICAO Annex 11, any significant change in the ATS system related to safety, including the implementation of reduced separation minima or a new procedure, will only become effective after a safety assessment has shown that they will meet an acceptable level of safety and that users have been consulted. When applicable, the responsible authority will make sure that the appropriate measures are taken for post-implementation monitoring to verify that the established level of safety is being met. When the acceptable level of safety cannot be expressed in quantitative terms due to the nature of the change, the safety assessment may rely on operational judgment.

11.2 **Current situation**

11.2.1 Since 2007, courses on safety management systems (SMS) have been dictated at a regional level and in all South American States. Also, since 2009, regional courses were dictated and in some States of the Region on State Safety Programmes (SSP) and in different forums SAM States have been encouraged to implement their SSP demanding implementation of the corresponding SMS to service providers.

11.2.2 During the process of safety assessment, it could be noted that a few States have implemented in an effective manner both their SSP as well as their SMS at a level of service providers; therefore a high commitment is required by States and service providers in order to reach this performance objective.

11.3. **Strategy for the Implementation of Performance Objectives**

11.3.1 Planning has been based on a main axis, as shown in Attachment D, called ‘Safety” (SAM PFF 25), as follows:

a) Safety (PFF SAM 25)

11.3 **References**

- ICAO Document 9750: Global Air Navigation Plan
- ICAO Document 8733: CAR/SAM Regional Air Navigation Plan
- ICAO Document 9882: Manual on ATM requirements
- ICAO Document 9854: Global ATM Operational Concept
- ICAO Document 9883: Manual on global performance of the air navigation system
- Safety Management Manual *(Doc. 9859)*

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ATTACHMENT A

TRAFFIC FORECASTS IN THE SAM REGION

Homogeneous Area of Routing AR-1

- Buenos Aires – Santiago de Chile
- Buenos Aires – Sao Paulo/Rio de Janeiro
- Santiago de Chile – Sao Paulo/Rio de Janeiro
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Rank	City Pair	Total Aircraft Movements/ 2007/	Total Aircraft Movements 2027	Average Annual Growth (Per cent) 2007-2027
1	Santiago(Intl) - Buenos Aires(Pistarini)	12185	39079	6.0
2	Sao Paulo(Intl) - Buenos Aires(Pistarini)	11843	37982	6.0
3	Rio De Janeiro(Intl) - Buenos Aires(Pistarini)	5484	33681	9.5
4	Santiago(Intl) - Rio de Janeiro	4979	25453	8.5
5	Santiago(Intl) - Sao Paulo	846	4741	9.0
	TOTAL	35337	140936	7.2

- Sao Paulo/Rio de Janeiro – Europe

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Sao Paulo-Paris	2921	8523	5.5
2	Sao Paulo-London	1665	5867	6.5
3	Rio De Janeiro-Paris	1559	6033	7.0
4	Sao Paulo-Madrid	1543	3721	4.5
5	Sao Paulo-Frankfurt	1521	3668	4.5
6	Sao Paulo-Milan	1284	4969	7.0
7	Rio De Janeiro-Madrid	1112	2213	3.5
8	Sao Paulo-Lisbon	992	2894	5.5
9	Rio De Janeiro-Lisbon	943	3323	6.5
10	Sao Paulo-Johannesburg	878	3094	6.5
11	Santiago-Rio De Janeiro	846	4741	9.0
12	Sao Paulo-Amsterdam	730	1761	4.5
13	Sao Paulo-Munich	726	2118	5.5
14	Zurich-Sao Paulo	676	1221	3.0
15	Rio De Janeiro-Porto	304	593	3.4
16	Sao Paulo-Porto	302	589	3.4
17	Rio De Janeiro-Frankfurt	190	371	3.4
18	Rio De Janeiro-Milan	16	31	3.4
19	Sao Paulo-Rome	2	4	3.4
	Total	18210	55734	5.8

Homogeneous Area of Routing AR-2

- Sac Paulo/Rio de Janeiro – Miami
- Sac Paulo/Rio de Janeiro – New York

Rank	City Pair	Total Aircraft Movement 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Rio de Jareiro-Miami	1082	1954	3.0
2	Sao Paulo- new York (Newark)	362	979	5.1
3	Sao Paulo-Miami	3482	6289	3.0
3	Sao Paulo-New York(JFK)	3233	5839	3.0
5	Sao Paulo-new York(Newark)	362	979	5.1
	Total	8521	16040	3.2

Homogeneous Area of Routing AR-3

- Sao Paulo/Rio de Janeiro — Lima
- Sao Paulo/Rio de Janeiro — Los Angeles

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Sao Paulo-Lima	2596	15944	9.5
2	Sao Paulo-Los Angeles	182	492	5.1
	Total	2778	16436	9.3

Homogeneous Area of Routing AR-4

- Santiago — Lima — Miami
- Buenos Aires — New York
- Buenos Aires — Miami

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Buenos Aires - New York	835	2258	5.1
2	Buenos Aires - Miami	2652	7172	5.1
3	Santiago - Lima	4208	21511	8.5
4	Lima - Miami	2220	6004	5.1
5	Santiago - Miami	1781	4816	5.1
	Total	11696	41761	6.6

Homogeneous Area of Routing AR-5

- North of South America — Europe

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Madrid - Bogota	1830	7774	7.5
2	Madrid - Caracas	1639	6342	7.0
3	Madrid - Lima	1323	3934	5.6
4	Madrid - Guayaquil	1099	3268	5.6
5	Paramaribo - Amsterdam	754	2242	5.6
6	Paris - Bogota	730	1318	3.0
7	Paris - Caracas	724	2322	6.0
8	Paris(Orly) - Cayenne	719	2782	7.0
9	Frankfurt - Caracas	676	2872	7.5
10	Milan - Caracas	520	1230	4.4
11	Quito - Madrid	519	1228	4.4
12	Lima - Amsterdam	493	1166	4.4
13	Lisbon - Caracas	434	1027	4.4
14	Santa Cruz - Madrid	433	1024	4.4
15	Funchal - Caracas	242	573	4.4
16	Madrid - Cali	227	537	4.4
17	Rome - Caracas	210	497	4.4
18	Porlamar - Frankfurt	209	494	4.4
19	Bogota - Barcelona	157	371	4.4
20	Tenerife - Caracas	110	260	4.4
21	Porto - Caracas	104	246	4.4
22	Porlamar - London	94	222	4.4
23	Bogota - Alicante	52	123	4.4
24	Porlamar - Manchester	48	114	4.4
25	Porlamar - Amsterdam	47	111	4.4
	Total above routes	13393	42079	5.9
	All other routes	58	137	4.4
	TOTAL	13451	42216	5.9

Homogeneous Area of Routing AR-7

Santiago — Lima — Los Angeles

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Santiago - Lima	4208	21511	8.5
2	Los Angeles - Lima	1155	3123	5.1
3	Santiago - Los Angeles	304	822	5.1
	Total	5667	25457	7.8

Homogeneous Area of Routing AR-8

- South America — South Africa

Rank	City Pair	Total Aircraft Movements 2007[2/]	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Sao Paulo - Johannesburg	878	3094	6.5
2	Buenos Aires - Cape Town	208	406	3.4
	Total	1086	3500	6.0

- Santiago de Chile — Easter Island — Papeete (PAC)

Rank	City Pair	Total Aircraft Movements 2007	Total Aircraft Movements 2027	Average Annual Growth(Per cent) 2007-2027
1	Santiago - Easter Island	499	1456	5.5
2	Easter Island - Papeete	209	504	4.5
	Total	708	1950	5.2

ATTACHMENT B

HOMOGENOUS AREAS AND MAIN TRAFFIC FLOWS IDENTIFIED

Note: The Table does not include Routing Area AR 6, since it is exclusive to the NAM and CAR Region.

-1- Routing Area (AR)	-2- Traffic flows	-3- FIRs involved	-4- Type of area covered	-5- Remarks
South American (SAM) Region				
AR 1	Buenos Aires-Santiago de Chile	Ezeiza, Mendoza, Santiago	Low-density continental	SAM intra-regional traffic flow
	Buenos Aires-Sao Paulo/Rio de Janeiro	Ezeiza, Montevideo, Curitiba, Brasilia	High-density continental	SAM intra-regional traffic flow
	Santiago de Chile-Sao Paulo/Rio de Janeiro	Santiago, Mendoza, Córdoba, Resistencia, Asunción, Curitiba, Brasilia	Low-density continental	SAM intra-regional traffic flow
	Sao Paulo/Rio de Janeiro-Europe	Brasilia, Recife, Atlantic	Low-density continental/oceanic	SAM/AFI/EUR inter-regional traffic flow
AR 2	Sao Paulo/Rio de Janeiro-Miami	Brasilia, Amazónica, Maiquetía, Curaçao, Kingston, Santo Domingo, Port- au-Prince, Havana, Miami	Low-density continental/oceanic	CAR/SAM/NAM inter- and tra-regional traffic flow
	Sao Paulo/Rio de Janeiro-New York	Brasilia, Amazónica, Paramaribo, Georgetown, Piarco, Rochambeau, San Juan (New York)	Low-density continental/oceanic	CAR/SAM/NAM/NAT inter- and intra-regional traffic flow

-1- Routing Area (AR)	-2- Traffic flows	-3- FIRs involved	-4- Type of area covered	-5- Remarks
AR 3	Sao Paulo/Rio de Janeiro-Lima	Brasilia, Curitiba, La Paz, Lima	Low-density continental	SAM intra-regional traffic
	Sao Paulo/Rio de Janeiro-Los Angeles	Brasilia, Amazónica, Bogota, Barranquilla, Panama, Central America, Mérida, Mexico, Mazatlán (Los Angeles)	Low-density continental	CAR/SAM/NAM inter- and intra-regional traffic flow
AR 4	Santiago - Lima - Miami	Santiago, Antofagasta, Lima, Guayaquil, Bogota, Barranquilla, Panama, Kingston, Havana, Miami.	Low-density continental/oceanic	CAR/SAM/NAM intra- and inter-regional traffic flow
	Buenos Aires - New York	Ezeiza, Resistencia, Asunción, La Paz, Amazónica, Maiquetía, Curaçao, Santo Domingo, Miami (New York)	Low-density continental/oceanic	CAR/SAM/NAM/NAT intra- and inter-regional traffic flow
	Buenos Aires - Miami	Ezeiza, Resistencia, Córdoba, La Paz, Amazónica, Bogota, Barranquilla, Kingston, Havana, Miami	Low-density continental/oceanic	CAR/SAM/NAM intra- and inter-regional traffic flow
AR 5	Northern South America - Europe	Guayaquil, Bogota, Maiquetía, Piarco (NAT-EUR)	High-density continental/oceanic	SAM/CAR/NAT/EUR inter-regional traffic flow
AR 7	Santiago - Lima - Los Angeles	Santiago, Antofagasta Lima, Guayaquil, Central America, Mexico, Mazatlán	Low-density oceanic	CAR/SAM /NAM intra- and inter-regional traffic flow

-1- Routing Area (AR)	-2- Traffic flows	-3- FIRs involved	-4- Type of area covered	-5- Remarks
AR 8	South America - South Africa	Ezeiza, Montevideo, Brasilia, Atlantic Johannesburg (AFI)	Low-density oceanic	SAM/AFI inter-regional traffic flow
	Santiago de Chile - Easter Island - Papeete (PAC)	Santiago, Easter Island, Tahiti	Low-density oceanic	SAM/PAC inter-regional traffic flow

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ATTACHMENT C

GLOBAL PLAN INITIATIVES AND THEIR RELATIONSHIP WITH THE MAIN GROUPS

GPI		En-route	Terminal Area	Aerodrome	Ancillary Infrastructure	Associated component of the Operational Concept
GPI-1	Flexible use of airspace	X	X			AOM, AUO
GPI-2	Reduced vertical separation minima	X				AOM, CM
GPI-3	Harmonisation of level systems	X				AOM, CM, AUO
GPI-4	Alignment of upper airspace classifications	X				AOM, CM, AUO
GPI-5	RNAV and RNP (Performance-based navigation)	X	X	X		AOM, AO, TS, CM, AUO
GPI-6	Air traffic flow management	X	X	X		AOM, AO, DCB, TS, CM, AUO
GPI-7	Dynamic and flexible ATS route management	X	X			AOM, AUO
GPI-8	Collaborative airspace design and management	X	X			AOM, AUO
GPI-9	Situational awareness	X	X	X	X	AO, TS, CM, AUO
GPI-10	Terminal area design and management		X			AOM, AO, TS, CM, AUO
GPI-11	RNP and RNAV SIDs and STARs		X			AOM, AO, TS, CM, AUO
GPI-12	Functional integration of ground and airborne systems		X		X	AOM, AO, TS, CM, AUO
GPI-13	Aerodrome design and management			X		AO, CM, AUO
GPI-14	Runway operations			X		AO, TS, CM, AUO
GPI-15	Match IMC and VMC operating capacity		X	X	X	AO, CM, AUO

GPI		En-route	Terminal Area	Aerodrome	Ancillary Infrastructure	Associated component of the Operational Concept
GPI-16	Decision support and alerting systems	X	X	X	X	DCB, TS, CM, AUO
GPI-17	Implementation of data Relationship applications	X	X	X		DCB, AO, TS, CM, AUO, ATMSDM
GPI-18	Aeronautical information	X	X	X	X	AOM, DCB, AO, TS, CM, AUO, ATMSDM
GPI-19	Meteorological systems	X	X	X	X	AOM, DCB, AO, AUO
GPI-20	WGS-84	X	X	X	X	AO, CM, AUO
GPI-21	Navigation systems	X	X	X	X	AO, TS, CM, AUO
GPI-22	Communication infrastructure	X	X	X	X	AO, TS, CM, AUO
GPI-23	Aeronautical radio spectrum	X	X	X	X	AO, TS, CM, AUO, ATMSDM

ATTACHMENT D

Performance Framework Form (PFF)

1. This outcome and management form is applicable to both regional and national planning, and includes references to the Global Plan. Other formats may be appropriate, but they must contain, at least, the elements described below.

1.1 Performance objective: Regional/national performance objectives should be defined, using the performance-based approach that best reflects the activities required to support ATM systems at regional/national level. Along their life cycle, performance objectives may change, depending on the evolution of the ATM system; therefore, during the implementation process, they should be coordinated with all the stakeholders in the ATM community and be at their disposal. The establishment of joint decision-making processes ensures that all stakeholders are involved and agree on the rquirements, tasks and timetables.

1.2 Regional performance objectives: Regional performance objectives are the improvements required by the air navigation system to support global performance objectives, and are related to the operational environments and the priorities applicable at regional level.

1.3 National performance objectives: National performance objectives are the improvements required by the air navigation system in support of regional performance objectives, and are related to the operational environments and priorities applicable at State level.

1.4 Benefits: Regional/national performance objectives should meet the expectations of the ATM community, as described in the operational concept; they should generate benefits for the parties involved; and should be attained through operational activities and techniques aligned with each performance objective.

1.5 Metrics: Metrics permit to measure the objectives achieved. The monitoring and measurement of the performance of ATM systems may require metrics in areas such as access, capacity, cost-effectiveness, efficiency, environment, flexibility, prediction capacity, and safety.

1.6 **Strategy:** ATM evolution requires a clearly-defined gradual strategy that includes the tasks and activities that best represent the national and regional planning processes, in keeping with the global planning framework. The goal is to achieve a harmonised implementation process that evolves towards a global and seamless ATM system. Accordingly, it is necessary to develop short- (1-5 years) and medium-term (6-10 years) work programmes focused on system improvements that reflect a clear work commitment of the parties involved.

1.7 **Components of the ATM operational concept:** Each strategy or set of tasks should be associated to components of the ATM operational concept. The designators of the ATM components are as follows:

- AOM – Airspace organisation and management
- DCB – Demand/capacity balancing
- AO – Aerodrome operations
- TS – Traffic synchronisation
- CM – Conflict management
- AUO – Airspace user operations
- ATM SDM – ATM service delivery management

1.8 **Tasks:** The regional/national work programmes, based on these PFF templates, should define the tasks required to attain said performance objective while maintaining a direct relationship with the components of the ATM system. The following principles should be taken into account when developing a work programme:

- Work should be organised using project management techniques and performance-based objectives, in line with ICAO strategic objectives.
- All tasks related to the compliance with the performance objectives should be carried out based on strategies, concepts, action plans and roadmaps that may be shared amongst the parties, with the main objective of attaining transparency through interoperability and harmonisation.
- Task planning should include the optimisation of human resources, as well as the promotion of the dynamic use of electronic communication amongst the parties (for example, Internet, video-conferences, tele-conferences, e-mail, telephone and fax). Likewise, resources should be used efficiently, avoiding duplication of work or unnecessary tasks.
- The process and work methods should ensure the possibility of measuring the performance objectives, comparing them with timetables, and easy reporting of the progress made at national and regional level to the PIRGs and ICAO Headquarters, respectively.

1.9 **Period:** Indicates the start and end of that task in particular.

1.10 **Responsibility:** Indicates the organisation/entity/individual responsible for the fulfilment or management of the associated tasks.

1.11 **Status:** The status basically monitors progress in the fulfilment of said task as it proceeds to the date of completion.

1.12 **Relationship with the global plan initiatives (GPIs)*:*** The 23 GPIs, as described in the Global Plan, provide a global strategic framework for the planning of air navigation systems, and are designed to contribute to the achievement of regional/national performance objectives. Each performance objective should be Relationshiped with the corresponding GPIs. The goal is to make sure that the evolutionary work process at State and regional level is integrated within the global planning framework.

2. The PFFs prepared for the performance objectives concerning ATM, CNS, MET, SAR, AIS, AGA/AOP, personnel competence management and SMS are presented below. Likewise, a matrix with the relationships amongs the aforementioned areas is included, in addition to a matrix with the inter-relationship amongst the PFFs.

REGIONAL PERFORMANCE OBJECTIVE: SAM 01 OPTIMISATION OF THE EN-ROUTE AIRSPACE STRUCTURE	
Benefits	
Safety	• Improves airspace safety
Environmental protection and sustaintable development of air transport	• Reduces miles flown, fuel consumption and, thus, CO2 emissions into the atmosphere; • Increases airspace capacity. • Takes advantage of aircraft capacity to fly optimum paths;
Metrics	• Number of implemented PBN (RNAV/RNP) routes • Reduction of CO2 emissions

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AUO**	a) Formulate airspace concept and establish requirements	2012 - 2013	Regional Project States	Valid
	b) Assess progress of Version 2 of the SAM ATS route network, and the implementation of RNAV 5 exclusionary space.	2012	States	Valid
	c) Optimise oceanic routes and implement RNAV10 (RNP10) corridors.	(*) - 2012	States	In progress
	d) Review and update the SAM PBN Roadmap and the ATS route network optimisation programme.	2012 - 2013	Regional Project States	Valid
	e) Assess the status of implementation of the en-route PBN action plan.	2012	States	Valid
	f) Complete the implementation of RNAV 5 continental routes.	2012 - 2014	States	Valid
	g) Implement non-permanent routes in defined continental airspaces.	2012 - 2016	States	Valid
	h) Prepare Version 03 of the ATS route network.	2013	Regional Project States	Valid
	i) Implement trunk routes between city pairs and/or selected airspaces, with RNP 4 specification for oceanic airspaces and RNP 2 in selected continental airspace.	2013 – 2018	States	Valid
	j) Define and implement the spacing between route centre lines as required	2013 - 2014	Regional Project States	Valid
	k) Implement random routes in defined continental airspaces.	2013 – 2018	States	Valid
	l) Assess safety before each implementation.	(*) - 2018 +	CARSAMMA States	In progress
	m) Monitor implementation progress.	2011 - 2018 +	GREPECAS	Valid
Relation-ship with GPIs	GPI/5: peformance-based navigation, GPI/7: management of dynamic and flexible ATS routes, GPI/8: collaborative airspace design and management.			

(*) Indicates that the task has started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 02 TMA AIRSPACE STRUCTURE OPTIMISATION	
Benefits	
Safety	• Implementation of continuous descent (CDO) operations • Increased safety during landing, thus reducing the incidence of CFIT • Strengthens airspace safety.
Environmental protection and sustainable development of air transport	• Reduces miles flown, fuel consumption and, consequently, CO2 emissions into the admosphere; • Increases airspace capacity, since it permits the establishment of separate arrival/departure flows, and even the segregation of IFR from VFR flights; • Takes advantage of aircraft capacity for flying optimum paths; • Airport arrival/departure under any meterological condition.
Metrics	• Number of TMAs with SIDs/STARs already implemented. • Number of TMAs that have implemented CDO operations.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM AUO CM	a) Assess the progress made in the terminal area PBN action plan.	2012	States	Valid
	b) Implement standard RNAV 1 arrival/departure routes in selected TMAs with ATS surveillance.	(*) - 2013	States	In progress
	c) Implement RNAV 1 and/or RNP 1 standard arrival/departure routes in all the TMAs of international airports.	2012 – 2016	States	Valid
	d) Implement CDO operations in all the TMAs of international airports.	2013 - 2018	States	Valid
	e) Implement RNAV1/RNP1 exclusionary airspace in high-density TMAs.	2015 – 2018 +	States	Valid
	f) Assess safety during stages prior to implementation	(*) - 2018	States	In progress
	g) Monitor progress during implementation.	(*) - 2018	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace, GPI/5: performance-based navigation, GPI/7: management of dynamic and flexible ATS routes, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs, and GPI/12: functional integration of ground and airborne systems.			

(*) Indicates that the task has been started before the period contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 03 IMPLEMENTATION OF RNP APPROACHES	
Benefits	
Safety	• Increases safety during landing, reducing the incidence of CFIT • Permits the establishment of safe approach procedures at airports with limitations due to rough terrain.
Environmental protection and sustainable development of air transport	• Reduces miles flown, fuel consumption, and thus CO2 emissions into the atmosphere; • Takes advantage of aircraft capacity for flying optimum paths; • Improved airport operational minima.
Metrics	• Number of RNP APCH procedures that have been implemented, including APV Baro VNAV.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AUO** **AO**	• Assess progress of PBN action plan on approach procedures.	2012	SAMIG	Valid
	• Implement RNP APCH procedures (or RNP AR APCH when operationally advantageous), including APV BARO VNAV, at least at all international airports.	(*) – 2018+	States	In progress
	• Start-up of the implementation of GLS procedures (GBAS landing) at selected airports.	2015 – 2018 +	States	Valid
	• Assess safety during the stages before implementation.	(*) - 2018+	States	In progress
	• Monitor the progress made during implementation.	(*) - 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace, GPI/5: performance-based navigation, GPI/8: collaborative airspace design and management, GPI/12: functional integration of ground and airborne systems and GPI/14; runway operations.			

(*) Indicates that the task has been started before the period contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 04 IMPROVEMENTS IN CIVIL/MILITARY COORDINATION AND COOPERATION	
Benefits	
Safety	• Strengthens airspace safety.
Environmental protection and sustainable development of air transport	• Permits a more efficient ATS route structure and increased airspace capacity. • Greater availability for civil aviation of restricted airspace at times when there is no military activity
Metrics	• Number of committees or similar civil/military coordination bodies implemented • Number of civil/military coordination and cooperation agreements implemented

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM	a) Develop guidance material on civil/military coordination and cooperation, for the definition of policies, procedures and national standards;	(*) - 2012	Regional Project States	In progress
	b) Establish committees or similar civil/military coordination bodies;	(*) - 2012	States	In progress
	c) Make arrangements to have a permanent Relationship and close cooperation between ATS civil units and the appropriate air defence units;	(*) - 2012	States	In progress
	d) Establish procedures for coordination of temporary reservation of airspace (TRA) and issuance of NOTAMs, when so required for ANSPs.	2012	States	Valid
	e) Conduct a regional review of special use airspace;	(*) - 2014	Regional Project States	In progress
	f) Develop a regional strategy and work programme for the implementation of the flexible use of airspace, through a phased approach, starting with a more dynamic sharing of restricted airspace.	2012 - 2018	Regional Project States	Valid
	g) Integration of aviation, civil and military activities.	2012 - 2015	States	Valid
	h) Monitor progress during implementation.	(*) - 2013	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace; GPI/18: Aeronautical information.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 05 FLIGHT PLAN IMPLEMENTATION	
Benefits	
Safety	• Improved safety management
Enviromental protection and sustainable development of air transport	• Expanded airspace capacity; • Improved implementation in terms of profitability; • Enhanced operational efficiency.
Metrics	• Number of States that have implemented the new FPL.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
SDM ATM	a) Guides on the transition to the new format of the filed flight plan.	(*)	ICAO	In progress
	b) Develop a regional strategy for the transition to the new format of the filed flight plan.	(*)	ICAO	In progress
	c) Identification of stakenolders and possible impact of the implementation of the new format of the filed flight plan (FPL/RPL/CPL).	(*)	States	In progress
	d) Assessment of current/future flight plan processing capabilities with respect to the new flight plan format.	(*)	States	In progress
	e) Behaviour trials between systems capable of processing the NEW flight plan.	(*)	States	In progress
	f) Development of contingency procedures and determination of technical/operational considerations for the transition.	(*)	States	In progress
	g) Identification of the main parties involved in FP data flow and the definition of the transition steps based on: • Systems capable of processing both formats: current and NEW. • Systems to be modernised / implemented before 2012 and that will be capable of processing the new format of the filed flight plan.	(*)	States	In progress
	h) Publication of transition actions, trials and other publications for users and interested parties	(*)	GREPECAS	In progress
	i) Assess transition actions and make adjustments.	(*)	States	In progress
	j) Implement the transition plan.	(*)	States	In progress
	k) Monitor transition activities.	(*)	ICAO	In progress
Relation-ship with GPIs	GPI/4: alignment of upper airspace classifications; GPI/1: flexible use of airspace; GPI/6 air traffic flow management; GPI/7: dynamic and flexible ATS route management; GPI/9: situational awareness; GPI/13: aerodrome management and design; GPI/14: runway operations; GPI/16: decision support and alerting systems; GPI/17: implementation of Data link applications; GPI/18: aeronautical information; GPI/19: meteorological systems; GPI/21: navigation systems; GPI/22: communication infrastructure			

NOTE: This PFF is based on the format presented to the CNS/ATM/SG/1 in March 2010. This Subgroup is responsible for the development of tasks.

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 06 ATFM IMPLEMENTATION	
Benefits	
Enviromental protection and sustainable development of air transport	• Less delays caused by meteorological and traffic conditions, leading to a reduced consumption of fuel and emission of pollutants; • Improved and more fluid traffic flows; • Improved prediction; • Improved management of the demand that exceeds service in ATC sectors and aerodromes; • Operational efficiency; • Incresed airport capacity; • Improved airspace capacity;
Metrics	• Number of flights delayed due to measures implemented by ATC

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
DCB **AO** **AOM** **CM**	a) Assess the progress made in the ATFM implementation work programme	2012	States	Valid
	b) Develop a regional method for establishing demand/capacity forecasts	(*) - 2013	States	In progress
	c) Develop and implement regional procedures for an efficient and optimum use of aerodrome and runway capacity;	(*) - 2014	States	In progress
	d) Develop and implement methods for improving efficiency, as required, through airspace management (AOM), CNS systems, ATS coordination.	(*) - 2015	States	In progress
	e) Develop a strategy and frame of reference for the implementation of the centralised ATFM unit;	(*) - 2015	States	In progress
	f) Implement the centralised ATFM unit;	2015 – 2018+	States	Valid
	g) Develop and implement operational procedures between Centralised ATFM units for inter-regional demand/capacity balancing;	2015 – 2018+	States	Valid
	h) Monitor progress during implementation.	(*) – 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace; GPI/6: air traffic flow management; GPI/7: dynamic and flexible management of ATS routes; GPI/9: situational awareness; GPI/13 aerodrome design and management; GPI/14: runway operations; and GPI/16: decision support and alerting systems.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 07 IMPROVE ATM SITUATIONAL AWARENESS	
Benefits	
Safety	• Reduces number of CFIT accidents • Enhances safety.
Enviromental protection and sustainable development of air transport	• Improved air traffic demand • Contributes to collaboration between the flight crew and the ATM system • Contributes to collaborative decision-making (CDM) through the sharing of aeronautical data • Reduced workload for pilots and controllers • Increases airspace capacity • Availability of electronic terrain and obstacle data in the cockpit • Contributes to operational efficiency
Metrics	• Number of interconnected ATC automated systems • Number of ACCs with AIDC • Number of ACCs with CPDLC tools

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
ATM-SDM AO	a) Develop a guide and an action plan for improving situational awareness of pilots and controllers.	(*) - 2012	Regional Project	In progress
	b) Implement flight plan data processing systems (new FPL format) and data communication tools between ACCs.	(*) – 2014	States	In progress
	c) Implement ATS surveillance technologies and their applications as required.	2012 – 2018+	States	Valid
	d) Implement air-ground communication systems through Data link.	(*) – 2018+	States	In progress
	e) Implement advanced automation support tools to contribute to aeronautical information sharing.	2015 – 2018+	States	Valid
	f) Monitor the implementation	(*) – 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/1: Flexible use of airspace; GPI/6: air traffic flow management; and GPI/7: dynamic and flexible ATS route management; GPI/9: situational awareness; GPI/13: aerodrome design and management; GPI/14: runway operations; y GPI/16: decision support and alerting systems; GPI/17: implementation of Data link applications; GPI/18: aeronautical information; GPI/19: meteorological systems, GPI/22: communication infrastructure.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 08 IMPROVEMENTS TO THE AERONAUTICAL FIXED SERVICE IN THE SAM REGION	
Benefits	
Safety	• Reduction of operational coordination errors between adjacent ACCs. • Increased ATM situational awareness. • Reduced pilot and controller workload.
Environmental protection and sustainable development of air transport	• Increased capacity and availability of aeronautical fixed service in support of ATS, MET, AIS and SAR applications. • Support to ATFM / CDM.
Metrics	• Number of States interconnected to the AMHS. • Number of States that have operationally implemented AIDC. • Percentage of phases implemented for improving the regional ATN network.

2012 – 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM ATM-SDM DCB CM AUO	a) Complete the implementation of AMHS systems in those States that do not have such systems yet.	(*) - 2013	States	In progress
	b) Agreement for AMHS interconnection through the establisment of MoUs	(*) - 2014	States	In progress
	c) Implement communication services for the centralised ATFM	2015 - 2018+	States	Valid
	d) Implement AIDC in the automated centres of the SAM Region;	(*) - 2013	States	In progress
	e) The operational implementation of AIDC for the automatic hand-off of flight plans between ACCs of adjacent States.	(*) - 2014	States	In progress
	f) Improve the regional ATN network	2012 -2015	States	Valid
	g) Monitor implementation progress	2012-2017	GREPECAS	Valid
Relation-ship with GPIs	GPI/6: ATFM, GPI/9: situational awareness, GPI/ 16: decision support and alerting systems, GPI/18: aeronautical information, GPI/17: data link applications, GPI/19: meteorological systems, GPI/22: communication infrastructure.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 09 IMPROVEMENTS TO THE AERONAUTICAL MOBILE SERVICES IN THE SAM REGION	
Benefits	
Safety	• Reduction of operational coordination errors between adjacent ACCs, making ATS coordination more efficient. • Reduction of pilot and controller workload;
Environmental protection and sustainable development of air transport	• Assured coverage and quality of communications in ATS service; • Increased availability of communications for the ATS service; • Support to AIM/MET service; • Assured radio frequency spectrum assigned to aviation for the communication service;
Metrics	• Percentage of compliance with FASID Table 2-A. • Number of CPDLC systems implemented. • Number of D-ATIS systems implemented.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **ATM-SDM** **DCB** **CM**	a) Complete the implementation of the services required in Table CNS 2-A "Aeronautical Mobile Service - AMSS"	(*) - 2014	States	In progress
	b) Continental en-route: Complete coverage of VHF communications in the lower airspace, when operations so require.	2012- 2015	States	Valid
	c) Oceanic en-route: Maintain the HF service according to the requirements of Table CNS 2B HF network designators for CAR/SAM aeronautical stations.	2012-2017	States	Valid
	d) Implement CPDLC in oceanic areas.	(*) - 2018	States	In progress
	e) Implement CPDLC in selected continental areas.	2012- 2018	States	Valid
	f) Terminal area: Implementation of different VHF channels for control tower and APP services at all aerports where a single channel is used for APP and control tower services.	(*) - 2015	States	In progress
	g) Implementation of D-ATIS services.	2012-2017	States	Valid
	h) Protection of the radio frequency spectrum used for current and foreseen communication services	2012-2018	States ICAO	Valid
	i) Monitor implementation progress	2012-2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/6: ATFM, GPI/9: Situational awareness, GPI/17: Data link applications, GPI/19: Meteorological systems, GPI/22: Communication infrastructure, GPI 23: Aeronautical radio spectrum.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 10 IMPROVEMENTS TO NAVIGATION SYSTEMS IN THE SAM REGION	
Benefits	
Safety	• Support to aircraft spacing; • Reduced pilot and controller workload; • Increased landing safety, avoiding CFIT
Environmental protection and sustainable development of air transport	• Increased airspace capacity and structure; • Assurance of the radio frequency spectrum assigned to aviation for the air navigation service; • Increased integrity of the GNSS system • Support to PBN implementation.
Metrics	• Number of deactivated NDBs • Number of deactivated VORs. • Number of GLS implemented. • Percentage of VOR/DME systems coverage in support of PBN applications

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **ATM-SDM** **TS** **AUO**	a) Complete NDB phase-out.	2012- 2018+	States	Valid
	b) Maintain VOR/DME infrastructure in selected TMA.	2012-2018+	States	Valid
	c) Begin deactivation of VOR systems for en-route operations.	2015-2018	States	Valid
	d) Maintain ILS infrastructure.	2012- 2018	States	Valid
	e) Implement GLS (GBAS landing) at airports with sufficient operational demand.	2015-2018+	States	Valid
	f) Modernise flight trial platforms for GNSS applications.	2012-2017	States	Valid
	g) Protection of the radio frequency spectrum used for current and future radio navigation services	2012-2018	States ICAO	Valid
	h) Implementation of new VOR/DME systems in support of PBN	(*) - 2013	States ICAO	Valid
	i) Monitor implementation progress	2012-2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/5: RNAV and RNP; GPI/6: ATFM; GPI/7: dynamic and flexible ATS route management; GPI/10: terminal area design and management; GPI/11: RNP and RNAV SIDs and STARs; GPI/12: functional integration of ground and airborne systems; GPI/13: aerodrome design and management; GPI/14: runway operations; GPI/21: navigation systems; GPI 23: aeronautical radio spectrum.			

REGIONAL PERFORMANCE OBJECTIVE: SAM 11 IMPROVEMENTS TO THE ATS SURVEILLANCE SERVICE IN THE SAM REGION	
Benefits	
Safety	• Increased ATM situational awareness; • Improved ATS coordination, reducing coordination errors between adjacent ACCs; • Reduction of pilot and controller workload;
Environmental protection and sustainable development of air transport	• Facilitates ATS planning; • Increased airspace capacity; • Assurance of the radio frequency spectrum assigned to aviation for the air surveillance service; • Supports the implementation of PBN and random routes.
Metrics	• Number of ADS-C systems implemented in oceanic FIRs. • Number of adjacent ACCs with exchange of ATS surveillance data. • Percentage of enoure airspace for upper levels with ADS-B coverage. • Number of A-SMGS systems implemented.

2012 – 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AO** **TS** **CM** **ATM-SDM**	a) implement ADS-B and/or MLAT systems in terminal areas and en-route.	2012-2018	States	Valid
	b) Implement surface movement guidance and control systems (A-SMGCS) at airports with high complexity and traffic.	2013- 2018+	States	Valid
	c) Implement the ADS-C service in all States with responsibility over an oceanic FIR.	(*) - 2018	States	In progress
	d) Implement the exchange of ATS surveillance data between adjacent ACCs.	(*)- 2018+	States	In progress
	e) Protection of the radio frequency spectrum used for current and future radio navigation services	2012 - 2018	States ICAO	Valid
	f) Monitor implementation progress	2012-2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/5: RNAV and RNP; GPI/6: ATFM; GPI/9: situational awareness; GPI/10: terminal area design and management; GPI/11: RNP and RNAV SIDs and STARs with; GPI/12: functional integration of ground and on-board systems; GPI/13: aerodrome design and management; GPI/14: runway operations; GPI/17: data link applications, GPI/22: communication infrastructure, GPI 23: aeronautical radio spectrum.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 12 IMPLEMENTATION OF THE MET SERVICE QUALITY MANAGEMENT SYSTEM				
Benefits				
Safety	• Ensure the quality of meteorological data and products provided to all the users of the ATM community • Improve the trust of the user with respect to meteorological data used for flight planning and re-planning.			
Metrics	• Number of States with implemented MET-QMS.			
2012 – 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM, AO AUO ATMSDM DCB	a) Validate the MET-QMS guide	(*) - 2012	States	In progress
	b) Establish a programme for the implementation of a quality management system for aeronautical meteorological services (MET-AMS)	2012-2013	Regional Project States	Valid
	c) Execute the programme for the implementation of a quality management system.	2012-2013	Regional Project States	Valid
	d) Develop the LAR-MET	2012-2015	Regional Project States	Valid
	e) Certification of the MET/QMS quality management system by an approved organisation.	2013-2015	States	Valid
	f) Monitor the process of implementation of the quality management system of aeronautical meteorological services.	2012-2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/18: Aeronautical information and GPI/19: Meteorological systems.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 13 IMPROVEMENTS IN MET FACILITIES				
Benefits				
Safety	• Provide more reliable products to all the ATM community. • Assistance in decision-making for the planning of new air routes. • Assurance of timely access by user to meteorological data and products • Contribute to situational awareness of aeronautical users for all weather operations (AWO).			
Metrics	• Number of aerodromes with operative AWOS. • Number of MWOs with the required equipment and systems. • Number of States with revised and updated weather tables.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM **DCB** **AO** **AUO** **ATM-SDM** **CM**	a) Establish a regional plan for the automation of meteorological data at all aerodromes of the AOP Table. b) Establish a regional plan to strengthen Meteorological Watch Offices (MWOs) with the infrastructure required for an effective surveillance in the FIRs.	2012	States	Valid
	c) Implement regional plans for the automation of MET data and strengtheninig of MWOs	2012-2013	States	Valid
	d) Establish programmes for periodic inspection and calibration of meteorological instruments and EMA(s)	2012-2014	States	Valid
	e) Develop a programme for reviewing and updating aerodrome meteorological tables.	2012	States	Valid
	f) Implement the programme for revising and updating aerodrome meteorological tables.	2012-2013	States	Valid
	g) Monitor implementation programmes	2013-2017	GREPECAS States	Valid
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/14: Runway operations, GPI/18: Aeronautical information and GPI/19: Meteorological systems.			

REGIONAL PERFORMANCE OBJECTIVE: SAM 14 IMPROVEMENTS IN THE IMPLEMENTATION OF INTERNATIONAL AIRWAYS VOLCANO WATCH (IAVW), SURVILLANCE OF THE ACCIDENTAL RELEASE OF RADIOACTIVE MATERIAL AND THE ISSUANCE OF SIGMETs	
Benefits	
Safety	• Increased flight safety due to the supply of information on volcanic ash and severe phenomena that may affect flight safety.
Enviromental protection and sustainable	• Contributes to pre-flight planning, optimising air routes with respect to volcanic ash and the accidental release of radioactive material. • Contributes to the planning of new air routes in a safe and sustainable manner.
Metrics	• Number of States with IAVW and their implemented evolutions. • Regional contingency plan for volcanic ash and accidental release of radioactive material, developed.

2012 – 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AO** **AUO** **ATMSDM** **DCB** **CM**	a)Develop a plan for the implementation of improvements in the international airways volcano watch and the accidental release radioactive material into the atmosphere.	2012	Regional Project	Valid
	b) Develop a guide for IAVW implementation in the Region, based on ICAO Document 9766.	(*) - 2013	RO LIMA/States	In progress
	c)Update the letters of agreement between CAAs/MET/State vulcanologic bodies, describing the responsibilities of each institution in case of volcanic activity and accidental release of radioactive material.	2012-2013	Estado	Valid
	d) Where applicable, develop written agreements with national meteorological services (NMS) in case of accidental release of radioactive material.	2012-2014	States	Valid
	e)Update the letters of operational agreement between ATS/MET units, and sign agreements with AIS and AGA (include the cases of volcanic ash deposition and accidental release of radioactive material in aerodrome emergency plans)	2012-2013	States	Valid
	f) Implement the VONA form for the transfer of information on volcanic or precursor activity by vulcanologic bodies.	2012-2013	States	Valid
	g) Review and update the national emergency plan for cases of volcanic activity and accidental release of radioactive material.	2012-2013	States	Valid

	h) Develop a regional contingency plan for cases of volcanic activity and/or accidental release of radioactive material.	2012-2013	Regional Project	Valid
	i) Update the procedures in MWOs and VAACs according to the evolution of IAVW.	2013-2017	States	Valid
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/14: Runway operations, GPI/16: Decision support and alerting systems, GPI/18: Aeronautical information and GPI/19: Meteorological systems.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 15 IMPROVEMENTS IN OPMET DATA EXCHANGE AND FOLLOW-UP OF WAFS EVOLUTION	
Benefits	
Safety	• Timely provision of duly coded OPMET data to the ATM community • Increased regional use of meteorological forecasts (upper wind, turbulence, icing, convective clouds).
Environmental protection and development of air transport	• Increased efficiency of operations and reduced carbon emissions
Metrics	• Increased availability of OPMET data (in percentage) of the States at regional and international level. • Number of States that have implemented WAFS and its evolutions.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM DCB AO AUO ATMSDM CM	a) Establish a regional procedure to ensure timely availability of duly coded OPMET meteorological data	(*) -2018	States / Brasilia OPMET database	In progress
	b) Develop contingency procedures for the dissemination of OPMET data through the Internet in case of communication system failure.	2012 - 2013	States	Valid
	c) Implement the new turbulence, icing, WINTEM and convective cloud forecasts	(*) - 2013	States	In progress
	d) Develop a transition plan for OPMET data coding in XML code	2013-2014	Regional Project	Valid
	e) Implement a plan for the transition of OPMET data to the XML format	2014-2018	States	Valid
	f) Establish plans for the migration to ISCS G3 and implementation of WIFS.	(*) - 2014	States	In progress
	g) Develop, together with COM units, a migration plan that permits WAFS products to be compatible with the future NextGEN/SESAR environment.	2013-2018+	Regional Project	Valid
	h) Develop and implement regional procedures in support of ATM.	(*) - 2018+	ICAO States	In progress
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/14: Runway operations, GPI/18: Aeronautical information and GPI/19: Meteorological systems.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 16 COOPERATION AND COORDINATION OF SAR SERVICES AT REGIONAL LEVEL				
Benefits				
Safety	• Favours the application of practical risk management principles			
Environmental protection and development of air transport	• Ensure cooperation and coordination amongst the interested parties			
Metrics	• Number of letters of agreement established for SAR • Number of SAR exercises conducted			
2012 - 2018 Strategy				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
N/A	a) Assess SAR requirements at regional level	2011	ICAO-States	Valid
	b) Adopt SAR requirements at regional level	2012 - 2014	States	Valid
	c) Comply with risk and quality management practical principles	(*) - 2017	States	In progress
	d) Develop, update, establish and ratify SAR agreements between States	(*) - 2017	States	In progress
	e) Harmonise SAR training plans	(*) - 2013	CATC	In progress
	f) Conduct annual SAR exercises at regional level	(*) - 2015	States	In progress
	g) Monitor implementation progress	2012 - 2018	GREPECAS	Valid
Relation-ship with GPIs	Not applicable			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 17 QUALITY, INTEGRITY AND AVAILABILITY OF ELECTRONIC AERONAUTICAL INFORMATION	
Benefits	
Safety	• Assures data integrity and resolution • Favours information traceability
Environmental protection and development of air transport	• Assures timely awareness of significant changes in information
Metrics	• Number of States that meet the AIRAC calendar • Number of States that have implemented QMS

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM **AO** **DCB** **AUO**	a) Assess the status of implementation and update of the AIM Action Plan	2012	Regional Project	Valid
	b) Effective compliance with the AIRAC system	(*) - 2013	States	In progress
	c) Establish a quality management system (QMS)	(*) - 2017	States	In progress
	d) Complete the use of WGS-84, taking into account the new data products	(*) - 2017	States	In progress
	e) Develop guidelines on service level agreements (SLAs) between data originators and AIM	2012 - 2013	Regional Project	Valid
	f) Establish agreements with data originators (SLAs)	2013 - 2015	States	Valid
	g) Monitor the implementation of the AIM Action Plan	2012 - 2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/16: Decision support and alerting systems, GPI/18: Aeronautical information, GPI/20: WGS-84, GPI/21: Navigation systems.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 18 TRANSITION TO THE PROVISION OF ELECTRONIC AERONAUTICAL INFORMATION				
Benefits				
Safety	• Support to ground proximity warning systems (GPWS) and procedure design and optimisation tools.			
Environmental protection and development of air transport	• Integration of dynamic and static information into a single display to facilitate situational awareness. • Access to information during all flight phases.			
Metrics	• Number of States that have implemented the transition plan			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM **AO** **CM** **DCB** **TS** **AUO** **ATM-SDM**	a) Prepare a transition plan for the provision of electronic aeronautical information	2012	Regional Project	Valid
	b) Implement the transition plan for the provision of electronic aeronautical information	2013 - 2018+	States	Valid
	c) Develop and establish a programme to facilitate AIS - MET interoperability	2016 - 2018+	Regional Project	Valid
	d) Monitor the implementation of the transition plan for the provision of electronic aeronautical information	2012 - 2018+	GREPECAS	Valid
Relation-ship with GPIs	GPI/9: Situational awareness, GPI/16: Decision support and alerting systems, GPI/18: Aeronautical information, GPI/19: Meteorological systems, GPI/20: WGS-84.			

REGIONAL PERFORMANCE OBJECTIVE: SAM 19 AERODROME DATA QUALITY REQUIREMENTS	
Benefits	
Safety	• Less aircraft accidents at the aerodrome; • Improved aircraft safety at the aerodrome;
Environmental protection and development of air transport	• Efficient aerodrome operations based on aerodrome data quality assurance.
Metrics	• Number of deficiencies related to non-compliance of the information contained in FASID Table AOP 1. Doc. 8733, Vol. II.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AO **CM** **AUO**	a) Develop a regional action plan to improve the quality of, and update, aerodrome information.	(*) - 2012	States/ICAO	In progress
	b) Update aerodrome obstacle data in the WGS-84 system.	(*) - 2012	States/ICAO	In progress
	c) Establish a letter of agreement with AIM for the provision of aerodrome data with the corresponding quality requirement.	(*) - 2012	States	In progress
	d) Monitor the implementation of the regional action plan for improving the quality of, and updating, aerodrome information.	(*) – 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/9: situational awareness, GPI/10: terminal area design and management, GPI/13: aerodrome design and management; GPI/14: runway operations, GPI/18: aeronautical information, GPI/20: WGS-84.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 20 AERODROME CERTIFICATION				
Benefits				
Safety	• Less aircraft accidents at the aerodrome;			
Environmental protection and development of air transport	• Efficient aerodrome operations based on compliance with the SARPs;			
Metrics	• Number of aerodromes with temporary certification; • Number of aerodromes with a validated certification.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AO **CM** **AUO** **DCB**	**PHASE I – Temporary certification** a) Develop a regional strategic plan for aerodrome certification.	(*) -2012	Regional Project	In progress
	b) Implement the regional strategic plan for aerodrome certification.	2012 – 2013	States	Valid
	c) Grant temporary certificates to aerodromes that meet the SARPs	2014 - 2015	States	Valid
	d) Establish a process of internal audits at aerodromes and SMS assurance.	2015 - 2018+	States	Valid
	PHASE II – Certification validation e) Develop the rules, procedures and documentation of the Latin American Aeronautical Regulations ofr Aerodromes (LAR-AGA).	(*) - 2013	Regional Project.	In progress
	f) Implement the LAR-AGA in the States of the Region.	2014 - 2015	States	Valid
	g) Validation of aerodrome certificates	2015 – 2018+	States	Valid
	h) Monitor the certification process.	2013 – 2018+	GREPECAS	Valid
Relation-ship with GPIs	GPI/9: situational awareness, GPI/10: terminal area design and management, GPI/13: aerodrome design and management. GPI/14: Runway operations.			

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REGIONAL PERFORMANCE OBJECTIVE: SAM 21 SAFE OPERATIONS AT AERODROMES THAT DO NOT MEET ICAO SARPS (CERTIFICATION WITH LIMITATIONS)	
Benefits	
Safety	• Disponer del SMS para aeródromos no certificables; • Reduce los accidentes de aeronaves en el aeródromo.
Environmental protection and development of air transport	• Operaciones de aeródromo eficientes.
Metrics	• Number of aerodromes certified with limitations.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AO **CM** **AUO**	a) Identify the regional airports with physical characteristics that do not comply with ICAO SARPs.	(*) – 2012	Regional Project	In progress
	b) Develop guidance for certification with limitations.	(*) - 2013	Regional Project	In progress
	c) Apply the guidance for the certification with limitations.	2013 - 2018	States	Valid
	d) Monitor the implementation of the process.	2012 - 2018	GREPECAS	Valid
Relation-ship with GPIs	GPI/9: situational awareness, GPI/13: aerodrome design and management. GPI/14: runway operations, GPI/9: situational awareness, GPI/13: aerodrome design and management. GPI/14: runway operations.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 22 OPTIMISATION OF AERODROME CAPACITY				
Benefits				
Safety	• Increases safe aircraft operations.			
Environmental protection and development of air transport	• Guides and operational criteria that increase capacity with efficiency; • Traffic fluidity in the movement areas.			
Metrics	• Number of aerodromes in which capacity has been optimised.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AO **CM** **AUO**	a) Assess the aerodromes whose runway and apron installed capacity is near saturation.	(*) - 2012	Regional Project	In progress
	b) Develop guidance that includes procedures to optimise aerodrome runway and apron capacity	(*)-2013	Regional Project	In progress
	c) Apply procedures for optimising aerodrome runway and apron capacity	2013-2018	States	Valid
	d) Establish letters of agreement according to requirements	2013-2018	States	Valid
	e) Monitor the optimisation of runway and apron capacity	(*)-2018	GREPECAS	In progress
Relation-ship with GPIs	GPI/9: situational awareness; GPI/13: aerodrome design and management; GPI/14: Runway operations.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 23 PREVENTION OF RUNWAY EXCURSIONS				
Benefits				
Safety	• Reduces runway excursions • Improves aircraft safety on the runway;			
Environmental protection and development of air transport	• Efficient aerodrome operations			
Metrics	• Number of aerodromes with action plans for runway excursion risk management • Number of runway excursions per year			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AO **CM** **AUO**	a) Develop a regional action plan for the identification of runway surface safety requirements.	(*) - 2012	Regional Project	In progress
	b) Assist States in the implementation of procedures for coordination among users, providers and authorities in relation to excursion prevention.	(*) - 2012	States	In progress
	c) Monitor the implementation of the regional action plan.	(*) – 2018+	GREPECAS	In progress
Relation-ship with GPIs	GPI/9: situational awareness, GPI/13: aerodrome design and management. GPI/14: Runway operations, GPI/18: Aeronautical information, GPI/20: WGS-84.			

(*) Indicates that the task has been started before the date contemplated in this planning.

REGIONAL PERFORMANCE OBJECTIVE: SAM 24 MANAGEMENT OF NAVIGATION SERVICE PERSONNEL COMPETENCE				
Benefits				
Safety	• Reinforces safety			
Environmental protection and development of air transport	• Information available with a level of quality that is appropriate to the requirements. • Personnel duly trained as instructors in the ATM operational concept. • Personnel duly trained for managing the ATM operational concept. • Increases situational awareness of the personnel. • Provides for quality air navigation services.			
Metrics	• Number of air navigation service personnel trained in the ATM Operational Concept. • Number of CATCs that participate in the training programme.			
2012 - 2018 ***Strategy***				
ATM OC COMPONENTS	**TASKS**	**PERIOD**	**RESPONSIBILITY**	**STATUS**
AOM, AO AUO DCB ATM-SDM CM TS	a) Develop the training programme for air navigation service personnel to respond to the new challenges, taking into account ICAO documentation.	2012-2013	Regional Project	Valid
	b) Follow up the activities of the New Generation of Aviation Professionals (NGAP) Special Team and implement the results	2012 - 2016	States	Valid
	c) Prepare a programme for instructors on training, planning and the ATM Operational Concept.	2013-2014	Regional Project	Valid
	d) Prepare guides for training, planning and the ATM Operational Concept.	2013-2014	Regional Project	Valid
	e) Strengthen Civil Aviation Training Centres (CATCs) of the Region.	2012 – 2014	States	Valid
	f) Implement courses on training, planning and the ATM Operational Concept	2013-2016	States	Valid
	g) Monitor the training and updating of air navigation personnel	2016-2018+	GREPECAS States	Valid
Relation-ship with GPIs	*The updating and training of aeronautical personnel is a cross-cutting issue for all ATM system areas.*			

REGIONAL PERFORMANCE OBJECTIVE: SAM 25 SAFETY	
Benefits	
Safety	• Strengthens safety
Metrics	• Number of States that have implemented SSPs • Number of international airports that have implemented SMS • Number of ATS services that have implemented SMS.

2012 - 2018
Strategy

ATM OC COMPONENTS	TASKS	PERIOD	RESPONSIBILITY	STATUS
AOM AUO	a) Follow up of the RASG-PA work programme, as a refernce for the activities of the region.	(*) – 2018+	States	In progress
	b) Prepare guidelines for the implementation of SMS in ATS services and international aerodromes.	(*) - 2012	Regional Project	In progress
	c) Assist in the implementation of State safety programmes (SSPs).	2012	Oficina Regional	Valid
	d) Develop regional safety databases	2012 - 2013	Regional Project	Valid
	e) Formulate guidelines for the protection of safety data	2012 - 2014	Regional Project	Valid
	f) Effective implementation of SMS in ATS and international airports.	(*) - 2014	States	In progress
	g) Develop and implement a training plan concerning the development and application of a safety case	(*) - 2012	States	In progress
	h) Continuous monitoring and periodical assessment of safety efficacy and SMS and SSP implementation	2012 - 2018	GREPECAS	Valid
Relation-ship with GPIs	The systemic safety approach is holistic, applied to the whole ATM system.			

(*) Indicates that the task has been started before the date contemplated in this planning.

MATRIX OF INTER-RELATIONSHIP BETWEEN PFFs (*)

		ATM	CNS			MET	AGA/AOP	
		PFF06	PFF07	PFF09	PFF10	PFF13	PFF18	PFF22
ATM	PFF03			SAM03: c) SAM09: e)				
	PFF05		SAM05: e), f) SAM07: c)					
	PFF06			SAM06: d) SAM09: d),e)	SAM06:c) SAM10: a), c), d)			
AIS	PFF16					SAM13: e) SAM16: f)	SAM16:f) SAM18:c)	SAM16:f) SAM22:b)
	PFF17	SAM06:e) SAM17:b)						

(*) This matrix relates the PFFs of different specialties that have interconnected tasks (the task of each PFF is indicated in parenthesis), so that the planner may know that, when fulfilling the tasks of a given PFF, they must be coordinated with another area in order to harmonise the implementation of the final service.

For example:
ATM: SAM 05: e), f)→ Indicates the development of a strategy and frame of reference for the implementation of an Centralised ATFM unit and its implementation
CNS: SAM 07: c) → Indicates that, in its planning, the CNS area must implement communication services for the centralised ATFM.

The final objective of these tasks is the implementation of the Centralised ATFM unit.

ATTACHMENT E

GLOSSARY OF ACRONYMS

ABAS	Aircraft-based augmentation system
ACC	Area control centre
ADS	Automatic dependence surveillance
ADS-B	ADS-broadcast
ADS-C	ADS-contract
AFTN	Aeronautical fixed telecommunication network
AGA	Aerodromes and ground aids
AIDC	ATS interfacility data communication
AIM	Aeronautical information management
AIRAC	Aeronautical information regulation and control
AIS	Aeronautical information service
AIXM	Aeronautical information exchange model
AMHS	ATS message handling system
ANP	Regional air navigation plan
ANS	Air navigation services
ANSP	Air navigation service provider
AO	Aerodrome operations
AOM	Airspace organisation and management
AOP	Aerodrome operations
APP	Approach control office or service
A-SMGCS	Advanced surface movement guidance and control system
ATC	Air traffic control
ATFM	Air traffic flow management
ATM	Air traffic management
ATMCP	Air traffic management operational concept panel
ATM SDM	ATM service delivery management
ATN	Aeronautical telecommunication network
ATS	Air traffic services
AUO	Airspace user operations
AWOS	Automated Weather Observing Systems
CAR / SAM	Caribbean and South American Regions
CDO	Continuous descent operations
CFIT	Controlled flight into terrain
CATC	Civil aviation training centre
CM	Conflict management
CNS	Communications, navigation and surveillance
CNS/ATM	Communications, navigation and surveillance/air traffic management
CO2	Carbon dioxide
CPDLC	Controller-pilot Data link communications

D-ATIS	Data link-automatic terminal information service
DCB	Demand/capacity balancing
DME	UHF distance-measuring equipment
eAIP	Aeronautical information publication
eTOD	Terrain and obstacle database
FANS	Future air navigation systems
FASID	Regional plan facilities and services implementation document (Document 8733)
FIR	Flight information region
FL	Flight level
FMS	Flight management system
FUA	Flexible use of airspace
GIS	Geographical information system
GLS	GPS-based *landing* system
GML	Geography markup language
GNSS	Global navigation satellite system
GPI	Global Plan initiatives
GPS	Global positioning system
GPWS	Ground proximity warning system
GREPECAS	CAR/SAM regional planning and implementation group
HF	High frequencies
HFDL	HF Data link
IAVW	International Airways Volcano Watch
IFR	Instrument flight rules
ILS	Instrument landing system
IMC	Instrument meteorological conditions
ISO	International Standards Organisation
IVATF	International Volcanic Ash Task Force
KPI	Key performance indicators
LAR	Latin American aeronautical regulations
MET	Meteorological services for air navigation
METAR	Aviation routine weather report, which provides the meteorological conditions prevailing at an aerodrome.
METWSG	Meteorological Warnings Study Group
MLAT	Multilateration – Surveillance system
MSAW	Minimum safe altitude warning
MWO	Meteorological Watch Office
NDB	Non-directional radio beacon
NGAP	New generation of aviation professionals
NM	Nautical miles
NPA	Non-precision approach
NOTAM	Notice to personnel concerned with flight operations
ICAO	International Civil Aviation Organization
OLDI	Direct data interchange

OMA	Automatic weather office
WMO	World Meteorological Organization
OPMET	Operational meteorological information
PDC	Predeparture clearance
PFF	Performance Framework Form
PIRG	Planning and implementation regional group
PSR	Primary surveillance radar
QMS	Quality management system
RASG-PA	Regional aviation safety group - Pan-American
REDDIG	South American digital communication network
RNAV	Area navigation
RNP	Required navigation performance
RVR	Runway visual range
RVSM	Reduced vertical separation minimum
SADIS	Satellite distribution system for information relating to air navigation
SAM	South American Region
SARPS	Standards and recommended practices
SID	Standard instrument departure
SIGMET	Significant weather
SLA	Service level agreement
AMSS	Aeronautical mobile-satellite service
SMGCS	Surface movement guidance and control system
SPECI	Special aviation weather report
SSR	Secondary surveillance radar
STAR	Standard instrument arrival
TMA	Terminal control area
TRA	Temporary reservation of airspace
TS	Traffic synchronisation
TWR	Aerodrome control tower or aerodrome control
VDL	VHF digital Relation-ship
VFR	Visual flight rules
VHF	Very high frequency
VOLMET	Meteorological information for aircraft in flight
VOR	VHF omnidirectional radio range
WAFS	World area forescast system
WATRS	Western Atlantic route system
WGS-84	World geodetic system — 1984
XML	Extensible markup language

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