

APPENDIX

SCENARIO OF OPERATIONAL ENHANCEMENTS IN AIR NAVIGATION SERVICES IN THE CAR REGION

1. Existing and emerging technologies provide options to support both tactical and strategic management of air navigation services. Notwithstanding, technology itself will not be able to provide ideal solutions both for airspace optimization and for aircraft operation.
2. Implementation activities should consider four principles: seek operational enhancement in air navigation services; use existing infrastructure and/or emerging technologies, if applicable; take advantage of the capacity of the structure of existing aircraft; and improve whatever is necessary with a performance-based approach.
3. This makes it necessary to develop Strategy Operational Improvements (SOIs) with a performance-based systemic approach. Some SOI, reflected as short and mid-term implementation Regional Performance Objectives (RPOs), for the CAR Region are as follows:

PBN Implementation - RPOs 1, 2 and 3

4. Many of the tasks described in strategies 1, 2, and 3 for PBN implementation are currently developed by States/Territories/International Organizations. ICAO has kept continuous coordination and monitoring on the latest implementations of RNAV routes and RNAV/RNP approach procedures.
5. Nevertheless, in the medium-term, the development of an integral PBN airspace concept envisaging new ATS capabilities to cover the future air traffic growth demand is required. This task will need the analysis of the new upper and lower airspace and airport adjacent areas requirements, through the coordination of a multi-disciplinary group on factors such as airspace organization and management (AOM), assessment of the existing fleet capacity and of the available CNS infrastructure, publication of routes and procedures, performance metrics, etc.

Infrastructure of navigation

6. The development of an airspace concept requires the analysis of DME coverage to comply with the implementation of RNAV procedures, as well as the assessment of the current navigation infrastructure and all the future GNSS applications. With the GNSS, we now have the ability with a single navigation source of operating globally to an accuracy of a few meters. This source, aided by satellite based augmentations and with GPS augmented by GBAS, will provide accuracy and availability capable of supporting approach down to Cat I. It is required to analyze current navigation infrastructure and all future navigation applications for the use of an on-board RNAV system.
7. **Attachment 1** to this Appendix includes a PBN action plan integrating the 3 RPOs with PBN implementation tasks for phases of flight en route, terminal area and approach. Navigation specifications should be in line with the PBN Roadmap approved by GREPECAS.

Improvements to Civil/Military Coordination and Co-operation - RPO 4

8. The need of a greater airspace and operations monitoring capacity requires improvements in the short term to the coordination among civil and military authorities. In the medium-term, this coordination will facilitate the implementation of the flexible use of airspace (FUA) and will also have an impact on an improvement to search and rescue (SAR) services that are presently provided by mixed civil and military agencies.
9. The use of airspace should be optimized through the dynamic interaction of civil and military air traffic services including real-time civil/military controller-to-controller co-ordination.
10. The flexible use of airspace (FUA) is based on the principle that airspace should not be designated purely as civil or military, but rather as a continuum in which all user requirements are accommodated to the greatest possible extent. FUA should result in the removal of large tracts of permanent or transient restricted airspace and special use airspace.
11. Where there are continued requirements to accommodate specific individual airspace uses, thereby blocking airspace of certain dimensions, this should be accommodated on a temporary basis. Airspace should be released immediately after the operation requiring the restriction is complete.
12. Bilateral or multilateral agreements to eliminate the blocked airspace across flight paths between national frontiers and on oceanic airspace should be supported.
13. The recent activation of the ATS Contingency Plan for the Port-au-Prince FIR caused by the earthquake occurred on 12 January 2010 made necessary greater civil-military coordination and therefore the flexible use of airspace in the C/CAR. As a result, humanitarian aid and Search and Rescue (SAR) air operations were facilitated in benefit of Haiti. This experience clearly shows the great benefits that may be obtained with these implementation tasks. The strategy with implementation tasks is found on RPO 4. **Attachment 1** to this Appendix presents the action plan for this RPO.

A Classification of upper airspace - RPO 5

14. In line with PBN objectives, airspace should be structured as a continuous space, free of discontinuities and operational differences wherein divergent rules and procedures are not applied.
15. Airspace classification should be based on a safety assessment, taking into account the volume and nature of air traffic in accordance with ICAO Annex 11. Commercial aircraft operations should be carried out within airspace with positive air traffic control service.
16. A harmonized class of airspace also facilitates the introduction and better use of data link communications, better flight plans processing systems, as well as airspace management coordination instruments and advanced message exchange capacities, and therefore a more flexible and dynamic airspace management is obtained. E/CAR/WG/32 — WP/02 — B3 —
17. The upper airspace should be published as A Classification when it is over FL195 in a uniform manner in CAR Region and, where possible, across several Regions. Attachment 1 to this Appendix presents the action plan for this RPO.

Improving demand and capacity balance (ATFM) - RPO 6

18. Traffic growth in the medium term will require the implementation of enhancements in the demand and capacity balance of air navigation services. The possible implementation areas should be coordinated at a regional level in order to avoid differences between the applicable procedures. Regional implementation ATFM activities go beyond year 2014.
19. Among the tasks requiring finalization in order to keep a demand and capacity balance (ATFM) are; Airspace Organization and Management (AOM) optimization, related with PBN airspace concept, calculation of ATS and aerodrome capacity, review of Letters of Agreement (LOAs) between ATC units, development of methods to predict the demand of services and definition of ATM situational awareness tools. Attachment 1 presents the action plan for this RPO.

Improving ATM situational awareness - RPO 7

20. Improving ATM situational awareness is translated in enhancements of automation in terms of communications and surveillance. The development of other SOI harmonized with the implementation plans of air navigation systems should be analyzed.
21. To this end, States/Territories/International Organizations should jointly cooperate regarding the interface of ATM automation technologies, in accordance with ICAO available guidelines. The strategy with the implementation tasks included in RPO 7 keeps a safe, gradual, evolutionary and interoperable vision for the implementation and interface of automated systems, facilitating information exchange and collaborative decision making of all the components of the ATM system for a transparent, flexible, optimum and dynamic airspace and international aerodromes management. Moreover, it increases the required safety levels. The strategy also takes into account the environment of data processing and networking, considering the use of ground and space segments for the interactive process of ATS information keeping the criteria of integrity, quality and real time.
22. ATM situational awareness includes improving the aspects of ATS surveillance. The most basic surveillance is the Primary Radar. Modern systems use a transponder located on the aircraft. Secondary radars (SSR) are connected to information sources in the aircraft to provide altitude and identification information. S Mode SSR also allows the provision of other parameters including the aircraft identity and the selected altitude. ADS-B differs from SSR because the aircraft determines its own position through GNSS and broadcasts this position to the ground and to other aircraft. Finally, Multilateration (MLAT) is the new technology used with its application for airports, en-route and terminal areas (TMA) to calculate the position of the aircraft using data of a number of Omni-directional separate receivers.
23. In this regard, the evaluation of surveillance infrastructure and identification of Surveillance system improvements to support continental en-route and terminal Airspace in CAR/SAM Regions, airspace classification, and ATFM are considered under this RPO. E/CAR/WG/32 — WP/02 — B4 —
24. RPO 7 contains the strategy, based on guidelines approved by GREPECAS Conclusion 12/35, with the short term tasks to design a phased operational architecture, assessing characteristics and features for the interface of the currently existing automated systems or that will be implemented in the ATS units, according to the ATC service levels provided, as well as other operational requirements for the future expectations of the ATM system components. An automation architecture should be designed according to the following stages:

Stage	Implementation of Requirements / Applications
Stage I	Flight plans messages processing system (FDPS/ Flight Data Processing System)
Stage II	Processing of radar data and of ATS surveillance (RDPS/ Radar data Processing System, ADS and data radar exchange); - mono-radar; - multi-radar; - radar data sharing; - automated digital messages transfer (automatic transfer of radar control / Automated traffic hand off, AIDC/ CPDLC, etc).
Stage III	Implementation of SWIM principles for Collaborative Decision Making (CDM) among the ATM components (AOM [Airspace Organization and Management], CM [conflict management], DCB [Demand/Capacity Balancing], AO [Aerodrome Operation], TS [Traffic Synchronization], AUO [Airspace User Operation], ASDM [ATM Service Demand Management], AIS, MET, statistics, etc)

25. Among the immediate tasks is the establishment of bilateral and multilateral agreements between States/Territories/International Organizations of adjacent airspace and regions for trials and the interface of ATS automated systems; the development of the required rules, procedures and guidance material and the development of human resources training programmes facilitating the implementation/interface and operation of ATS automated systems.
26. The *Interface Control Document (ICD) for the CAR/SAM Regions* should also be used in the exchange of coordination messages between adjacent ATS units automated systems, and contingency procedures should be developed. Attachment 1 to this Appendix presents the action plan for this RPO.

Implementation of the new ICAO Flight Plan Form - RPO 8

27. To implement Amendment 1 to the PANS-ATM (15th edition) on the new ICAO flight plan model format States/Territories/International Organizations should adopt the implementation strategy, and make the necessary efforts to ensure continuity of operations during the transition period. Likewise, coordination should be made with sufficient time in advance to the valid date, so that airspace users and ANSPs may coordinate and resolve any unexpected situation.
28. The strategy also contains a macro analysis of the impact in automated or non-automated ATM systems, as well as in data communication systems, both technical and operational in the CAR/SAM Regions. At the same time, it analyses the operational impact and establishes criteria for the preparation during transition and post-transition, as well as administrative and financial aspects. Also, it presents a performance objective which identifies deadlines and individual parts responsible to monitor the progress, so as to achieve a successful and coordinated implementation of the new flight plan format. E/CAR/WG/32 — WP/02 — B5 —
29. To ensure an effective coordination, by States/Territories/International Organizations should nominate points of contact (POC) which shall become the link between ICAO and States/Territories/International Organizations to exchange information on FPL implementation matters.

30. ICAO has developed a website called Flight Implementation Tracking System (FITS), where the status of implementation of the new regulations in all flight information regions (FIRs) will be registered. Information related with implementation dates will be uploaded into this website, which will be available so that points of contact designated by States/Territories/International Organizations exchange information on this matter. The action plan for this RPO is included in Attachment 1 to this Appendix

Attachment # 1 – ATM Implementation Work Programme 2010 to 2016

Eastern Caribbean Working Group
ATM Implementation Work Programme

E/CAR/WG/32 - WP/02
Attachment 1 to Appendix B

ID	Task Name/Tarea	Start/Inicio	Finish/Término	Compl.	Resp.	2007		2008		2009		2010		2011		2012		2013		2014	
						H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	
1	RPO 1, 2, 3- Implementation of performance based navigation (PBN)	Fri 28/12/01	Sat 31/12/16	0%	S-T-IQ/ E-T-OI																
2	Develop a regional strategy for the implementation of performance based navigation (PBN)	Sun 26/08/07	Mon 24/11/08	100%	S-T-IQ/ E-T-OI																
3	Develop a national action plan for the implementation of performance based navigation (PBN)	Thu 10/07/08	Fri 31/07/09	70%	S-T-IQ/ E-T-OI																
4	Develop a PBN roadmap for en-route, TMA and approach	Mon 10/07/08	Fri 31/08/07	100%	S-T-IQ/ E-T-OI																
5	Develop and implement a PBN airspace concept	Thu 10/07/08	Thu 14/11/13	25%	S-T-IQ/ E-T-OI																
6	Analyze and enhance air communication, navigation and surveillance infrastructure in accordance with PBN requirements	Fri 13/07/07	Sat 31/12/16	50%	S-T-IQ/ E-T-OI																
7	Collect aircraft navigation capability data	Fri 13/07/07	Mon 31/12/12	40%	S-T-IQ/ E-T-OI																
8	Implement collaborative decision making (CDM) process in coordination with stakeholders	Mon 16/07/07	Fri 28/12/12	40%	S-T-IQ/ E-T-OI																
9	Develop PBN Safety Assessment Programme	Mon 16/07/07	Fri 28/12/12	25%	S-T-IQ/ E-T-OI																
10	Conduct ATC simulations (fast time and/or real time), Live Trials, etc., as required	Mon 16/07/07	Fri 28/12/12	10%	S-T-IQ/ E-T-OI																
11	Publish regulations and procedures for aircraft and operators approval	Mon 16/07/07	Fri 31/12/10	50%	S-T-IQ/ E-T-OI																
12	Publish GNSS regulations	Mon 16/07/07	Fri 28/12/12	30%	S-T-IQ/ E-T-OI																
13	Finalize WGS-84 implementation	Mon 16/07/07	Fri 28/12/12	70%	S-T-IQ/ E-T-OI																
14	Publish AIP Supplement including applicable PBN standards and procedures	Mon 16/07/07	Fri 28/12/12	30%	S-T-IQ/ E-T-OI																
15	Update Letters of Agreement between ATC units	Mon 16/07/07	Fri 28/12/12	30%	S-T-IQ/ E-T-OI																
16	Develop PBN proposal for amendment to the applicable regional documentation	Mon 16/07/07	Fri 28/12/12	30%	S-T-IQ/ E-T-OI																
17	Evaluate and implement PBN requirements for ATC Automated Systems, considering the new ICAO Flight Plan Format	Mon 16/07/07	Fri 28/12/12	50%	S-T-IQ/ E-T-OI																
18	Develop Training programme for Pilots, ATCOs, operators and regulators	Mon 16/07/07	Fri 28/12/12	50%	S-T-IQ/ E-T-OI																
19	Implement PBN programme for oceanic, continental and terminal areas in accordance with PBN roadmap	Mon 16/07/07	Fri 30/12/16	5%	S-T-IQ/ E-T-OI																
20	Optimize the airspace structure through implementation of RNAV Routes in the upper airspace based on RNAV-5	Fri 28/12/01	Fri 28/12/12	60%	S-T-IQ/ E-T-OI																
21	Implement SIDs/STARs in terminal areas based on RNAV/1-2 and RNP1 specifications	Fri 28/12/01	Fri 28/12/12	60%	S-T-IQ/ E-T-OI																
22	Design and implement PBN APV approach procedures in accordance with Assembly Resolution A36-23 (BARO-VNAV)	Mon 16/07/07	Fri 30/12/16	5%	S-T-IQ/ E-T-OI																
23	Develop a performance measurement programme	Mon 16/07/07	Fri 30/12/16	50%	S-T-IQ/ E-T-OI																
24	Monitor System Performance	Mon 16/07/07	Fri 30/12/16	70%	S-T-IQ/ E-T-OI																
25	RPO 4- Enhance civil/military coordination and co-operation	Mon 16/05/05	Fri 30/12/16	0%	S-T-IQ/ E-T-OI																
26	Establish civil/military coordination bodies	Fri 28/03/08	Fri 28/12/12	70%	S-T-IQ/ E-T-OI																
27	Arrange for permanent liaison and close cooperation between civil ATS units and appropriate air defence units	Fri 06/07/07	Mon 31/12/12	70%	S-T-IQ/ E-T-OI																
28	Full integration of civil and military aviation activities by 2012	Mon 03/10/05	Fri 28/12/12	70%	S-T-IQ/ E-T-OI																

ATM Implementation Work Programme
Date: 01/06/10

Task

Progress

Milestone

Summary

Rolled Up Task

Rolled Up Milestone

Rolled Up Progress

Split

External Tasks

Project Summary

Group By Summary

— ATT1B 1 —

— ATT1B 2 —

Eastern Caribbean Working Group
ATM Implementation Work Programme

E/CAR/WG/32 - WP/02
Attachment 1 to Appendix B

ID	Task Name/Tarea	Start/Inicio	Finish/Termino	Compl.	Resp.	2007	2008	2009	2010	2011	2012	2013	2014
						H2	H1	H2	H1	H2	H1	H2	H1
55	Develop architecture through the automation level according to the ATM service provided in airspace and international aerodromes, assessing characteristics for interoperability, data bases, software and technical requirements	Fri 25/08/08	Fri 27/11/15	60%	S-T-J/O/ E-T-O/I								
56	Implement flight plan data processing system and electronic transmission tools	Fri 25/08/08	Wed 06/08/14	60%	S-T-J/O/ E-T-O/I								
57	Implement radar data sharing programs where benefits can be obtained	Fri 18/08/08	Fri 30/11/12	10%	S-T-J/O/ E-T-O/I								
58	Implement ATS surveillance systems and associated procedures	Fri 25/08/08	Fri 01/05/15	60%	S-T-J/O/ E-T-O/I								
59	Implement ATS automated message exchanges, in accordance with CAR/SAM ICD, as required	Fri 25/08/08	Fri 30/11/12	5%	S-T-J/O/ E-T-O/I								
60	Implement ground and air electronic warning	Fri 25/08/08	Fri 01/05/15	40%	S-T-J/O/ E-T-O/I								
61	Implement automated radar handovers	Fri 18/08/08	Fri 30/11/12	0%	S-T-J/O/ E-T-O/I								
62	Implement data link surveillance technologies and applications (ADS, CPDLC, AIDC), according to Doc 4444	Fri 18/08/08	Fri 27/11/15	0%	S-T-J/O/ E-T-O/I								
63	Implement teleconferences between ATM stakeholders	Fri 05/01/07	Fri 27/11/15	50%	S-T-J/O/ E-T-O/I								
64	Implement advanced automation support tools to increase sharing of AIS and MET information	Fri 13/04/07	Fri 26/05/15	20%	S-T-J/O/ E-T-O/I								
65	RPO 8- Implement New Flight Plan Format	Tue 30/09/08	Mon 31/12/12	0%	S-T-J/O/ E-T-O/I								
66	Evaluation of CURRENT-NEW flight plan processing capabilities regarding the New Flight Plan Format	Thu 01/10/09	Thu 30/12/10	10%	S-T-J/O/ E-T-O/I								
67	Conduct trials between systems with NEW flight Plan processing capacity	Mon 18/07/11	Sat 30/06/12	0%	S-T-J/O/ E-T-O/I								
68	Develop of contingency procedures and determination of operational-technical considerations for the transition	Mon 03/01/11	Thu 30/06/11	0%	S-T-J/O/ E-T-O/I								
69	Identification of key parties considering FP data flow and definition of transition steps based on systems with capability to process both formats current and NEW, and Systems to be upgraded/implemented before 2012 that will be capable to process NEW	Mon 03/01/11	Thu 30/06/11	0%	S-T-J/O/ E-T-O/I								
70	Publication on Transition Actions, Trials and other publication for the users and stakeholders	Mon 03/01/11	Sat 30/06/12	0%	S-T-J/O/ E-T-O/I								
71	Assessment of Transition Actions and make adjustments	Mon 18/07/11	Sat 30/06/12	0%	S-T-J/O/ E-T-O/I								
72	Conduct Transition plan	Mon 02/04/12	Sat 30/06/12	0%	S-T-J/O/ E-T-O/I								
73	Monitor implementation progress	Tue 30/09/08	Mon 31/12/12	20%	ICAO - OACI								
74	RPO 9- Improve search and rescue (SAR) system	Tue 30/09/08	Mon 31/12/12	0%	S-T-J/O/ E-T-O/I								
75	Conduct comprehensive analysis of SAR requirements based on risk assessment and quality assurance principles	Fri 15/05/09	Fri 14/05/10	0%	S-T-J/O/ E-T-O/I								
76	Foster the harmonization of policies, regulations, practices and procedures of the aeronautical/maritime SAR services, in accordance with ICAO Standards and Recommended Methods	Fri 15/05/09	Fri 28/12/12	20%	S-T-J/O/ E-T-O/I								
77	Develop, update and ratify SAR agreements with ROCs of adjacent States	Fri 15/05/09	Fri 28/12/12	20%	S-T-J/O/ E-T-O/I								
78	Foster the establishment of joint aeronautical/maritime SAR Committees, including the integration of voluntary SAR organizations, as well as the development of agreements between all the stakeholders of the national SAR service	Fri 15/05/09	Fri 28/12/12	30%	S-T-J/O/ E-T-O/I								

ATM Implementation Work Programme Date: 01/06/10	Task		Summary		Rolled Up Progress		Project Summary	
	Progress		Rolled Up Task		Split		Group By Summary	
	Milestone		Rolled Up Milestone		External Tasks			

— ATTIB 3 —

