



ICAO

International Civil Aviation Organization  
North American, Central American and Caribbean Office

WORKING PAPER

E/CAR/CATG/2 — WP/15  
06/07/15

**Sixth Eastern Caribbean Network Technical Group (E/CAR/NTG/6) and Fourth Eastern Caribbean Radar Data Sharing Ad-hoc Group (E/CAR/RD/4) Meetings**  
Miami, United States, 13 - 14 July 2015

**Agenda Item 4: Air Navigation Matters**

**4.2 Follow-up on the implementation of the NAM/CAR Regional Performance Based Air Navigation Plan (RPBANIP) and the *Port-of-Spain* Declaration Air Navigation Targets in the Eastern Caribbean**

**NAM/CAR PBN TASK FORCE REPORT**

(Presented by Trinidad and Tobago)

<b>EXECUTIVE SUMMARY</b>	
This working paper presents the updated progress report of the NAM/CAR PBN Task Force taking into consideration its work programme and its applicability to the E/CAR Region.	
<b>Action:</b>	Suggested actions are listed in Section 4
<i>Strategic Objectives:</i>	<ul style="list-style-type: none"><li>• Safety</li><li>• Air Navigation Capacity and Efficiency</li><li>• Environmental Protection</li></ul>
<i>References:</i>	<ul style="list-style-type: none"><li>• NAM/CAR RPBANIP Ver 3.0</li><li>• Final Report of the Fifth North American, Central American and Caribbean Directors of Civil Aviation Meeting (NACC/DCA/5)</li><li>• Second NAM/CAR Air Navigation Implementation Working Group Meeting (ANI/WG/2), Puntarenas, Costa Rica, 1 to 4 June 2015</li><li>• PBN TF teleconferences</li><li>• Final Report of the Fourth North American, Central American and Caribbean Working Group Meeting (NACC/WG/4)</li><li>• Report on PBN Survey NAMCAR Region (2014)</li></ul>

**1. Introduction**

1.1 Following the CATG/1 and NACC/WG/4 meetings, the rapporteur of the ANI/WG NAM/CAR PBN Taskforce suggested to the E/CAR representatives that since the E/CAR States/Territories were already invited to be members of the NAM/CAR PBN Taskforce and in order to avoid duplication of work, the issues relating to PBN implementation within the E/CAR Region could be handled under the NAM/CAR PBN Taskforce, and reported to the ATM Committee.

1.2 The first ANI/WG PBN Taskforce teleconference was held on 13 September 2013, and thereafter during subsequent TELCONS, the group developed and agreed on the Terms of Reference and developed a work programme.

1.3 During the ANI/WG/2 Meeting the PBN taskforce met as a Working Group Committee and discussed several issues related to working/information papers presented, and are working on an updated work programme.

1.4 The tasks in the work programme were developed in order to:

- Identify deficiencies and constraints with Regional PBN implementation, and to propose solutions that would facilitate resolution of such problems
- Develop and review material needed to meet the ICAO initiative on the introduction of Approach Procedure with Vertical Guidance (APV) approaches including Barometric Vertical Navigation (Baro-VNAV) and Required Navigation Performance-Authorization Required (RNP-AR) as part of the PBN initiative
- Assist with coordination of PBN routes within the CAR region as well as with adjacent regions to ensure Global harmonization

## **2. PBN TF Progress and results**

2.1 A survey form was distributed to States/Territories/Organizations within NAMCAR Region via State Letter EMX0129 – (28, FEB 2014). Though response to the survey was limited, a report was generated indicating the general issues with PBN implementation within the Region (**Appendix A**)

2.2 Following the NACC WG4 meeting in 2014, based on the objective of PBN training outlined in the work programme and under the RLA 09-801 project, two PBN implementation workshops were held at the ICAO NACC Office:

- The ICAO NAM/CAR/SAM Performance-Based Navigation (PBN) Approach Procedure Design Workshop - Special Implementation Project (SIP) 17 – 28 November 2014 provided training in Instrument Approach Procedure design and included technical training in developing RNAV approaches, Arrival and departure procedures, Baro VNAV Approaches and coding.
- The Workshop on Regional Implementation on Performance-Based Navigation (PBN) Airspace Redesign for the CAR Region, 04 – 08 May 2015, provided a platform for discussion between adjacent States/Territories and Organizations on airspace harmonization.

2.3 Both workshops were extremely well attended and were very informative to the participants. However, an initial analysis of the current airspace structure results in lack of harmonization which does not facilitate coordination and provision of Air Traffic Control (ATC) service, as well as limited use by operators. The diagnosis of some implementation projects of the States and Territories includes:

- The lack of information on reliable statistics on air operations growth in the States
- A lack of coordination of PBN implementation activities with the users

- Lack of update of training programmes for pilots and controllers
- The design of some Terminal Control Areas (TMAs) is not appropriate in view of the new aircraft navigation capabilities, such as:
- Published flight tracks are lengthy, exceeding TMAs boundaries, infringing non controlled airspace;
- Some waypoints have been established in uncontrolled G class airspace, causing confusions to the pilots
- IFR and VFR tracks are not segregated to cover ATC operational needs
- Some published tracks have resulted in ATS hot spots provoking TCAS report releases
- Not all automated ATS equipment have been updated for appropriate processing of flight plans in accordance with procedures with ICAO Doc 4444
- Not all States have issued suitable regulation for PBN operational certification and approval
- Some ATC units present ATS capacity limitations due to lack of qualified personnel
- Not all States have developed PBN national training plans
- Successful PBN implementation is closely dependent on the implementation of ATFM. Capacity gains derived by PBN airspace design are maximized by the proper management of traffic.

2.4 Based on the PBN TF analysis it is necessary that States develop a PBN Airspace Redesign Project to be implemented in the short term upon a PBN airspace comprehensive concept approach as a high priority matter for the CAR Region considering gate-to-gate operations for medium and long terms. The Project should meet safety objectives, ATS capacity and environment impact mitigation, including airspace organization details as well as regulatory and infrastructure requirements and annually assess benefits to environment obtained by route reduction and CO<sub>2</sub> reduction.

2.5 The Project for the redesign of airspace should consider air traffic increase for 2015-2017, through four phases as described in Doc 9992 - *Manual on the Use of Performance-based Navigation (PBN) in Airspace Design*:

- Planning
- Design
- Validation
- Implementation

2.6 In order to achieve successful PBN implementation, States should designate and foster the participation of their regulators, controllers, airspace planners, pilots/operators, military authority, general aviation representatives, etc. PBN projects should focus on RNAV routes implementation, RNP approach procedures, SIDs and STARs with CCO and CDO criteria, RNAV 10 or RNP 4 for Oceanic airspace as required.

2.7 The ICAO NACC Regional Office conducted a PBN GO TEAM mission to Port of Spain, Trinidad and Tobago, from 15 to 19 September 2014, led by Mr. Victor Hernández, Regional Officer, Air Traffic Management and Search and Rescue (ATM/SAR), with the assistance of two (2) additional Subject Matter Experts (SMEs), Mr Roberto Sosa from Central American Corporation for Air Navigation Services (COCESNA) and Mr Julio Cesar Martinez, (Mexico City). Trinidad and Tobago invited the States and Territories from within the ECAR Region as well as adjacent FIRs to participate in the Mission. Representatives from Antigua, Barbados, ECCAA, Grenada and Curacao participated in the mission which provided valuable information with regard to airspace design.

2.8 Following the mission, Trinidad and Tobago were required to develop and submit to the ICAO NACC Office, a PBN Airspace Redesign Concept for the Piarco FIR (Eastern Caribbean Region) by 31 March 2015. The deadline was met and the concept was presented to the PBN Taskforce during the PBN Workshop, 04 – 08 May 2015. Trinidad and Tobago advised that States/Territories/Organizations which had not already developed an airspace concept aligned with the PBN Concept for the Region were free to use the document as a template for their own plans. The ATM Committee Rapporteur distributed the Piarco FIR PBN Re-design Airspace Concept (Draft 1.0) to the members of the ECAR ATM Committee.

2.9 During the various teleconferences and as indicated in the report of the PBN Survey, it has been determined that the NAMCAR PBN Implementation Status of the region could be broadly categorized into:

- Advanced
- Intermediate
- Beginner

2.10 While there are two (2) States that are in the advanced stage of PBN implementation, most of the other States/Territories/Organizations are at various stages within the intermediate band. However, there are some that are encountering problems in developing their implementation plans and simply do not have the required resources (financial/human) allocated to PBN implementation.

2.11 There is general consensus in the taskforce that while many States/Territories/Organizations are working on airspace configuration, routing and approach issues within their area of responsibility, there is generally a lack of collaboration with neighbours. This results in disjointed plans that are not harmonized.

2.12 One of the other areas identified as an issue was lack of expertise and training in PBN related matters. During the taskforce teleconferences, members were asked to contribute any material they are authorized to share so that others would be able to learn from it. The task force member from Canada shared operational material from NAV CANADA's plan which was very informative. The member from the United States is working on the possibility of sharing training information. CANSO also advised that a PBN "Best Practices" document was available for all to utilize.

2.13 IATA gave a presentation to the taskforce highlighting the inefficient longitudinal separation across the NAM/CAR/SAM region. While some FIRs were using as low as 5NM in their own airspace, based on existing procedures and LOA's, in most cases, ten (10) minutes (80NM) were required for transfer from one FIR to the next. During the ANI/WG/2 meeting, IATA proposed that a more efficient longitudinal separation of 20 NM, based on GNSS (**requirements to be met**), could be utilized.

2.14 Both IATA and CANSO also expressed the view that many PBN procedures that have been implemented in the region are not being used by operators. Whether this is due to poor operational benefits or lack of end - user equipage needs to be determined. Nevertheless, this points to lack of proper stakeholder collaboration prior to the design of the procedure.

2.15 In January 2015, based on general consensus and collaboration with the ICAO NACC Office, the PBN Taskforce updated its work programme. **(Appendix B)**

2.16 During the ANI/WG/2 meeting, there was a discussion amongst the participants about subdividing the coordination of the taskforce tasks relating to the upper airspace route re-design into the three CAR sub-regions. Costa Rica accepted responsibility for the coordination of Central America activities and Trinidad and Tobago accepted responsibility for the Eastern Caribbean. The representative for Central Caribbean is to be determined.

2.17 Trinidad and Tobago has already held a TELCON with United States, (Miami FIR, San Juan FIR, New York Fir); Guyana, Suriname, CANSO, IATA, ICAO to begin working on a re-design of the upper airspace routes that flow between North and South America, through the ECAR Region. The minutes of this TELCON are included as an attachment to this WP. **(Appendix C)**

2.18 Trinidad and Tobago is planning to host a major ATFM CDM stakeholder meeting carded for three (3) days in November 2015 (actual dates to be determined). Trinidad and Tobago will be requesting the participation of all States/Territories within the ECAR Region and is willing to add a five (5) day PBN training component to this workshop to cater for those States within the ECAR Region that have difficulty in developing a PBN Airspace Concept. The PBN training/workshop will be conducted by the subject matter experts from Trinidad and Tobago.

### **3. Recommendations**

3.1 It is recommended that an Airspace Design Team be created within the ECAR ATM Committee to collaborate on the re-design of the airspace/routes within those portions of the Piarco FIR not under the jurisdiction of Trinidad and Tobago. The team should include representatives from Trinidad and Tobago and each of the States/Territories which currently hold responsibility for Terminal Airspaces (TMAs) within the FIR.

3.2 Those States/Territories which are currently not part of the NAMCAR PBN Taskforce are encouraged to join and participate in activities and discussions. Nominees can be emailed to the PBN taskforce rapporteur, Riaaz Mohammed ([rmohammed@caa.gov.tt](mailto:rmohammed@caa.gov.tt)).

3.3 E/CAR States/Territories are encouraged to consider the proposal by Trinidad and Tobago to host a PBN workshop/training seminar in November 2015.

**4. Suggested Actions**

4.1 The Meeting is invited to:

- a) evaluate the progress of the PBN TF;
- b) nominate/update their POCs for the NAM/CAR ANI/WG PBN Task Force and provide resources to the TF members to allow them to participate in activities;
- c) review and approve the PBN TF's recommendations; and
- d) propose any other action or task as deem necessary

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# REPORT ON PBN SURVEY NAMCAR REGION (2014)

NAMCAR ANIWG PBN TASKFORCE

JANUARY 2015

## Executive Summary

A PBN implementation status survey (*EMX0129 – 28 FEB 2014*) was prepared by the NAM/CAR Air Navigation Implementation Working Group (ANI/WG) PBN Implementation Airspace Concept Task Force. The survey corresponds to a PBN Task Force deliverable. Its main purpose was to collect information on PBN planning and implementation status from all States and Air Navigation Service Providers in order to update the regional PBN strategy and propose recommendations for improving PBN implementation in the NAM/CAR Regions.

The survey (*EMX0129*) was distributed to the following twenty (20) **States/Territories** and nine (9) **Organisations**:

ANTIGUA AND BARBUDA, ARUBA, BAHAMAS, BARBADOS, BELIZE, CANADA, CAYMAN ISLANDS, CURACAO, FRENCH ANTILLES, GRENADA, HAITI, JAMAICA, NETHERLANDS FOR BONAIRE, SAINT EUSTATIUS AND SABA ISLANDS, SAINT KITTS AND NEVIS, SAINT LUCIA, SAINT VINCENT AND THE GRENADINES, SAINT MAARTEN, TRINIDAD AND TOBAGO, UNITED KINGDOM FOR ANGUILLA; BRITISH VIRGIN ISLANDS; MONTSERRAT, UNITED STATES

ACI/LAC	AIPRORTS COUNCIL INTERNATIONAL/LATIN AMERICA-CARIBBEAN
ALTA	LATIN AMERICA AND CARIBBEAN AIR TRANSPORT ASSOCIATION
CANSO	CIVIL AIR NAVIGATION SERVICES ORGANISATION
CASSOS	CARIBBEAN AVIATION SAFETY AND SECURITY OVERSIGHT SYSTEM
COCESNA	CENTRAL AMERICAN CORPORATION FOR AIR NAVIGATION SERVICES
ECCAA	EASTERN CARIBBEAN CIVIL AVIATION AUTHORITY
IATA	INTERNATIONAL AIR TRANSPORT ASSOCIATION
IFALPA	INTERNATIONAL FEDERATION OF AIR LINE PILOTS ASSOCIATIONS
IFATCA	INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS

## Survey Responses

The taskforce received responses from the following seven (7) states and one Organization:

CANADA, COSTA RICA, CUBA, HONDURAS, SAINT LUCIA, TRINIDAD AND TOBAGO, UNITED STATES  
COCESNA



## General Review of Responses

While the responses received by the taskforce were limited in number, an analysis of the survey information received revealed that the implementation status in the region could be classified into three categories:

- States/Territories/Organizations that are advanced in their PBN implementation – PBN implementation plans were created and are being followed or modified based on dynamic situations. Resources such as equipment, subject matter experts, specialized PBN training for technical and operational staff are available in-house. Based on operational requirements PBN approach procedures have been implemented at major international airports and are utilized by airline operators. GNSS based procedures are used as a replacement and backup for conventional NAVAIDS and Electronic Terrain and Obstacle Data (e-TOD) are also in use. CCOs and CDOs have been implemented in many aerodromes and there are plans to continue PBN implementation throughout airspace/aerodromes as long as safety and efficiency improvements are required.
- States/Territories/Organizations that are in an intermediate stage of PBN Implementation – PBN implementation plans have been developed and in some instances are being followed. However there are implementation roadblocks such as unavailability of updated equipment, lack of subject matter experts (e.g. Instrument Flight Procedure Designers, Airspace Planners), high cost and unavailability of specialized training, lack of staff, poor CDM with relevant stakeholders etc.
- States/Territories/Organizations that are still formulating their PBN implementation plan – While most States have some type of RNAV approach procedures implemented, based on ICAO resolution A37-11, some do not yet have a complete implementation plan or airspace concept. Some of the issues include lack of understanding by decision makers, financial constraints, lack of staffing, lack of subject matter expertise, lack of specialized training, unavailability of up to date equipment, lack of CDM.

There were also generalized statements regarding the lack of available and accurate data on Aircraft equipage and certification. While some information is available from IATA, not all operators are IATA members and there are many instances where data is unavailable or inaccurate. Some States have tried using FPL data but recognize that this by itself is not enough.

## Recommendations

The PBN Taskforce recommends the following actions to improve the PBN implementation within the Region:

- States/Territories/Organizations need to update the POCs for the NAMCAR ANIWG PBN Taskforce and ensure that the members are provided with the resources to engage in group activities.
- A revised survey to be conducted ASAP to determine current status of PBN implementation throughout the Region. The Survey should be designed to collect information on:
  - PBN Planning status – (Has a plan been developed? Is it based on a valid operational concept? Is it being followed? Is there a project lead?)
  - Effectiveness of current PBN procedures – (Are the procedures that have been implemented being utilized by operators? If so why not? Have they reduced ATCO/Pilot workload?)
  - Roadblocks to implementation – (Decision-makers buy-in, Financial Constraints, Human Resources, Equipage etc.)
  - Areas where specialized training is required
  - States/Territories/Organizations willing to provide assistance to other States – (Provision of documentation, training plans, lending of SMEs etc.)
- States in need of assistance should make an official request to the ICAO NACC Office specifying the areas that they need support in.
- Where required, ICAO NACC Office engage in dialogue with the executive decision maker of the relevant States/Territories/Organizations to ensure the importance of PBN implementation is understood and more critically, highlight the fact that the provision of financial and human resources are required to meet this objective.
- Increased collaboration between States/Territories/Organizations in the region regarding airspace and routing designs to ensure harmonization.
- Under the RLA 09-801 Regional project, the formation of an ad hoc team of specialists consisting of Subject Matter Experts in PBN Implementation Planning, Airspace Design, Instrument Flight Procedure Design, PBN training to assist those States/Territories/Organizations that need assistance with formulating their PBN Plans.

**NAMCAR PBN TASK/FORCE WORK PROGRAMME**

<b>Task Name/Area</b>	<b>Deliverables</b>	<b>START DATE (DD/MM/YY)</b>	<b>END DATE (DD/MM/YY)</b>	<b>PERCENTAGE COMPLETED (%)</b>	<b>RESPONSIBLE</b>	<b>REMARKS</b>
<b>IMPLEMENTATION OF PERFORMANCE BASED NAVIGATION (PBN)</b>						
1. Establish a Regional PBN Task Force to assist with implementation	NACC PBN TASKFORCE to aid with facilitating PBN implementation as identified in NAMCAR RPBANIP	30/Jul/13	28/Oct/13	100%	ICAO ICAO NACC/States Territories/International Organizations	COMPLETED
2. Conduct a review of NAM/CAR RPBANIP RPO (1) and make suggestions/recommendations to ICAO (if required)	TASKFORCE ensures that PBN initiatives within the RPBANIP are current/valid and cater to the needs of the operations within the region	July 2013	15/Dec/2013	100%	NAM/CAR PBN TASKFORCE	COMPLETED
3. Develop and promulgate a survey form to all States within the region to establish updated PBN implementation status and also to identify roadblocks	Current status of PBN implementation within the region is known. Roadblocks are identified, reported to ICAO NACC Regional Office and the TASKFORCE will work with ICAO and the States involved to develop plan of action to solve the problems	1 November 2013	15 December 2013	100%	NAM/CAR PBN TASKFORCE/ ICAO NACC	COMPLETED February 20 <sup>th</sup> 2014 Survey Form promulgated by NACC Regional Office
4. Report Regional PBN Implementation status to ICAO NACC Office with recommendations on solving implementation issues	Office and the TASKFORCE will work with ICAO and the States involved to develop plan of action to solve the problems	31 January 2014	June 30 <sup>th</sup> 2014	100%	NAM/CAR PBN TASKFORCE Rapporteur	COMPLETED  JAN 31 2015
5. Conduct a study on PBN requirements for ATC Automated Systems	Report identifying the information required to be displayed to ATCOs on their situational displays	1/Jan/14	June 30 2015		NAM/CAR PBN TASKFORCE	VALID  Revised Date JUNE 30 2015

Task Name/Area	Deliverables	START DATE (DD/MM/YY)	END DATE (DD/MM/YY)	PERCENTAGE COMPLETED (%)	RESPONSIBLE	REMARKS
6. Redistribute PBN implementation Process Planning, Design, Validation, Implementation						
7. Ad hoc Team on SME's						
8. Assist States within region with modifying LOAs	Templates for States to follow in developing LOA's Assistance from the TASKFORCE, through ICAO, in collaborating with other regions (E.g SAM, NAT, AFI etc.)	1 January 2014	31 August 2015		NAM/CAR PBN TASKFORCE/ICAO NACC	Valid AUG 31 2015
9. Assist States in developing training programme/ for Pilots, ATCOs, operators and regulators	Standardized Model for States to utilize in designing the PBN training programs	30 Jun 2014	December 2015		NAM/CAR PBN TASKFORCE/ICAO NACC	VALID
10. Assist States in developing PBN airspace re-design Project, based on ICAO Doc 9992	Assisting States in the implementation of PBN airspace concept : a) Revision of regional Route network, b) TMA redesign. c) PBN approach procedures	June 2014	June 30 2015	50 %	NAM/CAR PBN TASKFORCE	Valid June 30 2015 Workshops have been conducted to assist States with this Examples of some States Airspace Concept Documents have been shared with TF members

<b>Task Name/Area</b>	<b>Deliverables</b>	<b>START DATE (DD/MM/YY)</b>	<b>END DATE (DD/MM/YY)</b>	<b>PERCENTAGE COMPLETED (%)</b>	<b>RESPONSIBLE</b>	<b>REMARKS</b>
11. Coordination of progress within TF Members	4 phased project regarding Plan, Design, Validation and Implementation	31/Jan/14	28/Feb/14	100%	TF Rapporteur	Completed
12. Develop a performance measurement programme	Inputs to ANI/WG Rapporteur for presentation to NACC/WG/04 Meeting Standardized method for performance metrics	June 2014	December 2015		NAM/CAR PBN TASKFORCE	VALID
13. ANI/WG PBN Task Force Meeting	Follow-up activities	04/May/15	8/May/15	100%	All Members	Completed

— END —