



ICAO

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WORKING PAPER

E/CAR/CATG/5 — WP/07
06/09/21

Fifth Eastern Caribbean Civil Aviation Technical Group Meeting (E/CAR/CATG/5)
Online, 8 to 10 September 2021

Agenda Item 3:

Air Navigation Matters

- 3.2 Development of the e-ANP Volume I, II and III
 - 3.2.1 Progress reports of the AIM, AGA, ATM, CNS, MET and SAR Committees

UPDATE ON PBN ACTIVITIES WITHIN THE E/CAR REGION

(Presented by Trinidad and Tobago)

EXECUTIVE SUMMARY

This working paper presents an update on PBN activities within the E/CAR Region. The paper discusses the following:

- E/CAR Region TMAs PBN Redesign
- Creation of Connector (Feeder Routes) to link E/CAR TMAs with Upper Level Routes in the Piarco FIR
- Implementation of East/West Upper Level RNAV 5 Routes between Piarco and Maiquetia FIRs

Action:	Suggested actions are presented in Section 10.
Strategic Objectives:	<ul style="list-style-type: none">• Safety• Air Navigation Capacity and Efficiency• Environmental Protection
References:	<ul style="list-style-type: none">• Trinidad and Tobago Progress Report of PBN Activities within the E/CAR region from Fourth Eastern Caribbean Civil Aviation Technical Group (E/CAR/CATG/4) Meeting - Saint George's, Grenada, 6 – 7 September 2018• Piarco FIR Airspace Redesign Concept 2015-2020• Report from ICAO 8th E/CAR ATM Sub-Committee Meeting on the E/CAR Airspace Design Project (October 09, 2020)• Optimization of the CAR Region Airspace Meeting – NAM/CAR Air Navigation Implementation Working Group (ANI/WG) Performance-Based Navigation (PBN) Airspace Concept Task Force (ANI/WG/PBN/TF/OPT) (October 20-23, 2020)

1. Introduction

1.1 During the ICAO 8th E/CAR ATM Sub-Committee Meeting on the E/CAR Airspace Design Project held on October 9, 2020, Trinidad and Tobago reiterated its commitment to lend its technical expertise to assist with challenges the other Eastern Caribbean (E/CAR) States/Territories might have with airspace design, specifically, anything above the initial approach altitude / minimum sector altitude, to the boundary positions with Piarco's airspace. For operations below these altitudes, Trinidad and Tobago would be able to assist in the required flight procedure design projects if the States could provide the necessary terrain and obstacle data. Trinidad and Tobago also stated that they can could also assist with training presentations/briefings if necessary.

1.2 A preliminary report, from the Trinidad and Tobago Civil Aviation Authority (TTCAA) ANS Planning and Development (ANSPD) Department, was submitted to and reviewed by the participants of the ATM Sub-Committee meeting. The report presented specific proposals for the redesign of the respective E/CAR terminal airspaces (TMAs).

2. Identification of Project Areas for the CDM Process

2.1 Based on the geographical layout of the TMAs within the Piarco FIR, the complexities of traffic flows, interdependent coordination requirements, and similar operational considerations, it was decided that the airspace redesign project within the E/CAR region would be split into three (3) main project areas.

2.2 Area 1 (Appendix A-Figure 1) includes the following States/TMAs:

- a) Barbados (TBPB);
- b) St Vincent and the Grenadines (TVSA);
- c) Grenada (TGPY);
- d) St Lucia (TLPL); and
- e) Martinique (TFFF).

2.3 Area 2 (Appendix A-Figure 2) includes the following States/TMAs:

- a) Antigua (TAPA),
- b) Guadeloupe (TFFR); and
- c) Martinique (TFFF).

2.4 Area 3 (Appendix A-Figure 3) includes the following States/TMAs:

- a) Piarco (TTPP); and
- b) Grenada (TGPY).

2.5 The Trinidad and Tobago Airspace Design team is comprised of members of the TTCAA Air Navigation Services Planning and Development (ANSPD) department:

- a) Mr Robert Rooplal:
 - i. ANSPD Air Traffic Management Officer (ATMO);

- Planning and Technical Evaluation Unit (PTEU)
 - ii. Air Traffic Controller (ATCO)
 - Twenty (20) + years of experience (Enroute, Approach and Aerodrome)
 - iii. TTCAA PBN SME since 2015;
 - iv. ICAO E/CAR PBN PoC since 2016;
 - v. PBN Redesign Project lead for Piarco (TTZP) FIR upper airspace routes; and
 - vi. Airspace Designer software operator.
- b) Mr Ellison Ramlogan
- i. ANSPD Unit Chief;
 - Airspace and Procedure Design Unit (APDU)
 - ii. Air Traffic Controller (ATCO)
 - Twenty (20) + years of experience (Enroute, Approach and Aerodrome)
 - iii. TTCAA PBN SME since 2010;
 - iv. Lead Airspace and Instrument Flight Procedure Designer;
 - v. PBN Redesign Project team-member for TTZP FIR upper airspace routes;
 - vi. ICAO ICARD database State Manager for Trinidad and Tobago and the Piarco FIR;
 - vii. Airspace Designer software operator;
 - viii. Flight Procedure Design and Airspace Management (FPDAM) software operator;
 - ix. Flight Procedure Satellite Analysis Tool (FPSAT) software operator; and
 - x. Responsible for the development of procedures to facilitate continuous climb operations (CCOs) and continuous descent operations (CDOs) within the TTZP FIR;
 - RNAV Feeder Routes
 - RNAV Standard Instrument Departures (SIDs)
 - RNAV Standard Instrument Arrivals (STARs)
 - RNAV Instrument Approach Procedures (IAPs)
- c) Mr Arion Wallen
- i. ANSPD Flight Procedure Designer;
 - Airspace and Procedure Design Unit (APDU)
 - ii. Air Traffic Controller (ATCO)
 - Ten (10) years of experience (Enroute, Approach and Aerodrome)
 - iii. PBN Redesign Project team-member for TTZP FIR upper airspace routes;
 - Airspace and Instrument Flight Procedure Designer;
 - iv. Airspace Designer software operator;
 - v. Flight Procedure Design and Airspace Management (FPDAM) software operator;
 - vi. Flight Procedure Satellite Analysis Tool (FPSAT) software operator; and
 - vii. Design support for the development of procedures to facilitate continuous climb operations (CCOs) and continuous descent operations (CDOs) within the TTZP FIR.

2.6 Having received the approval of the E/CAR ATM Sub-Committee and the Piarco ATS & ANSS department, the redesign project commenced by engaging the E/CAR States in Area 1 on the design proposals for the connectivity between the upper airspace enroute systems of the Piarco FIR/UTA with the lower airspace routes within the E/CAR TMAs.

3. Initial CDM Process

3.1 Trinidad and Tobago / ECAR State Collaborative Decision Making (CDM) meetings were held as follows:

- a) St Vincent and the Grenadines
 - i. CDM Meeting on October 14, 2020
 - ii. (A preliminary meeting was previously held with TVSA in April 2020, requested by TVSA)
- b) St Lucia
 - i. CDM Meeting on October 15, 2020
- c) Grenada
 - i. CDM Meeting on October 16, 2020
- d) Barbados
 - i. CDM Meeting on November 25, 2020
- e) St Lucia/St Vincent and the Grenadines
 - i. CDM meeting on December 09, 2020

3.2 The main purpose of these CDM meetings was to familiarize the E/CAR teams with the airspace concepts (Arrival and Departure feeder routes) and evaluate the feasibility of the various project elements (**Appendix B**).

3.3 The following are some of the major design considerations discussed:

- a) Finalization of the ARR/DEP routes and associated waypoints can only take place after further collaborations and agreements with the respective E/CAR TMAs;
- b) Establishment of Lateral separation of at least 10 NM between related ARR and DEP routes;
- c) This lateral spacing would extend up to 100 NM – 120 NM from the applicable aerodrome;
- d) In some cases, the primary upper level route may be considered part of the ARR or DEP route; and
- e) It would be expected that Air Traffic Controllers (ATCOs) may tactically issue instructions that do not follow the ARR/DEP route systems based on scenarios such as reduced traffic density or unusual weather conditions.

3.4 The following main benefits were also highlighted:

- a) Harmonized integration of traffic flows between the Upper enroute system of the Piarco FIR and the E/CAR TMAs;
- b) Facilitation of Continuous Climb Operations (CCOs) for departing traffic;
- c) Facilitation of Continuous Descent Operations (CDOs) for arriving traffic;
- d) Improved airline operator fuel efficiencies;
- e) Reduced flight track mileage (where direct flight trajectories are possible);
- f) Reduced carbon emissions due to aircraft operations;
- g) Improved airspace traffic flow organization; and
- h) Reduced ATC workload related to:
 - i. Ensuring aircraft separations (surveillance may be required)
 - ii. ATCO - Pilot communications

iii. Coordination between ATS units

3.5 All of the participating E/CAR TMAs welcomed the initiatives and have indicated general agreements with the initial proposals. However, the E/CAR teams expressed their interest in receiving various levels of PBN training / briefings. The Piarco Airspace Design Team agrees that this would be beneficial as it would assist the E/CAR teams in developing a better understanding of the PBN airspace optimization concepts and facilitate the CDM processes.

4. Proposed PBN/Airspace Optimization Briefings

4.1 In June 2021, Trinidad and Tobago coordinated with Barbados, Grenada, St Lucia and St Vincent and the Grenadines concerning the basic PBN and airspace optimization briefings. The following proposals were made:

- a) Briefing No. 1 – General PBN Concepts for all interested E/CAR TMAs; and
- b) Briefing No. 2 – Individual TMA briefings; specific to the needs of the respective E/CAR TMA

4.2 Briefing No. 1 is expected to include the following subject matter areas:

- a) Introduction to ICAO Global Air Navigation Plan (GANP)
- b) Understanding the ICAO Aviation System Block Upgrades (ASBUs)
- c) Introduction to PBN Concepts and Applications
- d) Review Piarco FIR PBN Redesign Plan
- e) Review of RNAV Instrument Approach Procedures (IAPs)
- f) Review of RNAV Standard Instrument Departures (SIDs)
- g) Review RNAV Standard Instrument Arrivals (STARs)

The duration of the session is expected to be five (5) hours, inclusive of breaks as well as a question and answer period.

4.3 The proposed schedule for delivery is as follows:

- a) Briefing No. 1: Any period between November 15 – 30, 2021; and
- b) Briefing No. 2: Any period between January 17 – February 04, 2022

4.4 Prior to the second briefing, discussions will be held between Piarco and each TMA to determine their needs, and thereafter the contents of the presentation will be determined.

5. Implementation of Upper Level RNAV 5 Routes between the Piarco and Maiquetia FIRs

5.1 In July 2021, Trinidad and Tobago and Venezuela, through the ICAO NACC and SAM Offices, agreed to realign the East/West routes that traverse both FIRs (See Appendix C). The conventional routes UA550, UA551 and UA561 will be removed. This optimization utilizes the PBN concept to improve the flight paths of overflights and to create trajectories for arriving and departing aircraft from the TMAs that would allow for continuous climb and descent operations. The proposed implementation date is the third quarter of 2022.

5.2 Trinidad and Tobago will coordinate with each TMA to design the entry and exit position for the feeder routes that emanate from these upper level routes.

6. Current status of RNAV instrument approaches at aerodromes within the E/CAR Region

6.1 In 2014, ICAO States agreed to implement the Port of Spain Declaration mandates, which included:

- a) Implementation of Baro-VNAV Instrument Approach Procedures by December 2016
 - i. Eastern Caribbean Civil Aviation Authority (ECCAA) signed on behalf of E/CAR States (TGPY, TVSA, TLPL and TAPA); and
 - ii. Barbados (TBPB) was also a signatory
- b) Based on a preliminary review of flight operations into the E/CAR
 - i. Major international (excluding BWA & LIA) Airline Operators and General Aviation executive jet operations are certified for Baro-VNAV operations
 - ii. Airline Operators (with VNAV capabilities) into aerodromes (without VNAV IAPs) include:
 - AAL (TVSA, TGPY, TAPA)
 - AJT (TVSA, TGPY)
 - BAW (TAPA)
 - JBU (TGPY)
 - ROU (TVSA, TGPY)
 - VIR (TGPY, TAPA)

6.2 Table 1 below illustrates the current status of instrument approaches at aerodromes within the E/CAR.

AERODROME	RUNWAY	LNAV	BARO-VNAV
TTPP	RWY 10	✓	✓
	RWY 28	✓	✓
TTCP	RWY 11	✓	✓
	RWY 29	✓	✓
TGPY	RWY 10	✓	✗
	RWY 28	✓	✗
TVSA	RWY 04	✓	✗
	RWY 22	✓	✗
TVSC	RWY 13	✓	✗
	RWY 31	✓	✗
TLPL	RWY 10	✓	✓
	RWY 28	✓	✓
TLPC	RWY 09	✓	✗
	RWY 27	✗	✗
TAPA	RWY 07	✓	✗
	RWY 25	✗	✗
TBPB	RWY 09	✓	✓
	RWY 27	✓	✓

7. Proposed Schedule of CDM Tasks to be accomplished

7.1 The CDM process for Area 1 States/TMAs will continue with a tripartite meeting with Martinique, St Lucia and Trinidad & Tobago tentatively being scheduled for November 2021.

7.2 The CDM process for the Area 2 States/TMAs is expected to begin in the first quarter of 2022.

7.3 The CDM process for the Area 3 States/TMAs is expected to begin in the second quarter of 2022 and continue into the third quarter of 2022. The project objectives will be closely tied to the development of the RNAV SIDs and STARs within the Piarco TMA (TTPP and TTCP aerodromes).

7.4 It should be noted that the implementation of the Arrival and Departure feeder route system, connecting the TMAs with the Piarco FIR, will be effected taking regional harmonization into consideration.

7.5 Precluding any unanticipated issues with any particular State, one (1) coordinated implementation date for the entire region is the overall objective.

8. Project Concerns

8.1 Coordination with the E/CAR States, ECCAA and ICAO is also required, to address a number of identified critical ICAO International Codes and Routes Designators (ICARD) database issues related to the TMAs' waypoint five letter name codes (5LNCs), including:

- a) Addressing 5LNCs that have not been registered on the database i.e. the non-registration of 5LNCs currently being utilized within the TMAs but having the status of being unused and available for selection by any other State within the region including Trinidad and Tobago (Piarco);
- b) Addressing 5LNCs that are currently duplicated, i.e. presently in use in other airspaces;
- c) Addressing 5LNCs that are currently registered to other States; and
- d) Updated standard proximity checks for possible conflicts with similar sounding 5LNCs that are located within the same geographical region but not identified as such within the database.

8.2 The effectiveness of the CDM process and the resultant timeline for implementation are based on the availability of Points of Contacts (POCs) from all States to coordinate with the airspace design team of Trinidad and Tobago.

8.3 Technical assistance is required from an ICAO Separation and Airspace Safety Panel (SASP) SME regarding clarifications on the protected airspace concept and its applications.

9. Recommendations

9.1 The CDM process continue between Trinidad and Tobago and the States within the Eastern Caribbean.

9.2 States within the Eastern Caribbean allocate personnel to coordinate the implementation of the required feeder routes.

9.3 States that have not implemented RNAV approaches should conduct an analysis to determine the necessity.

9.4 States to coordinate with ECCAA and ICAO regarding discrepancies within the ICARD database.

9.5 States should take advantage of the briefings being provided by Trinidad and Tobago.

9.6 Discussions to take place with the relevant E/CAR States in order to finalize the scheduling for the delivery of PBN Briefing No. 1. The presentation logistics are as follows:

- a) Online Platform using Microsoft Teams
- b) Sessions would be limited to a maximum of fifteen (15) participants
- c) Sessions will be conducted Monday – Friday between the hours of 8:00 am – 4:00 pm

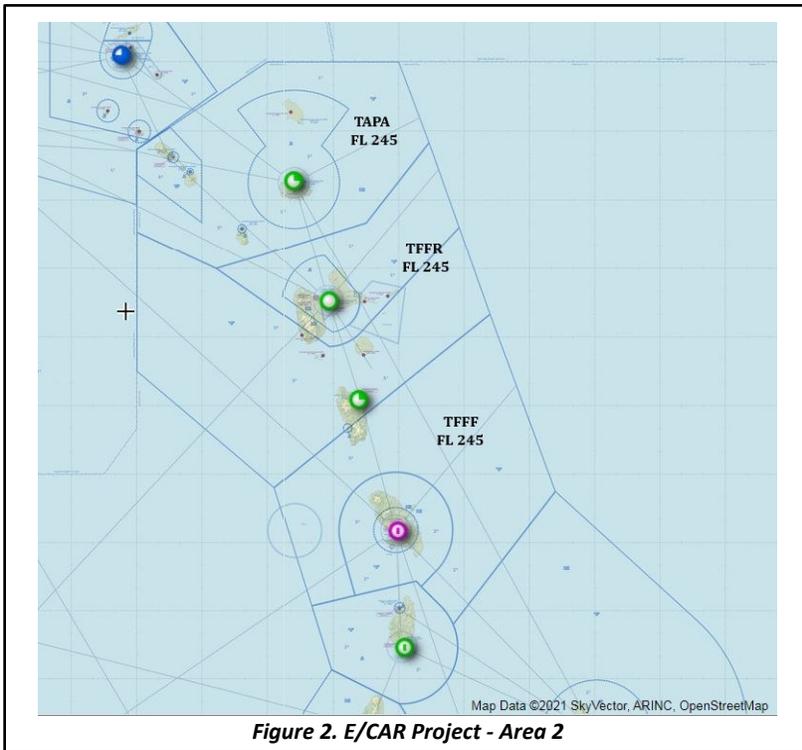
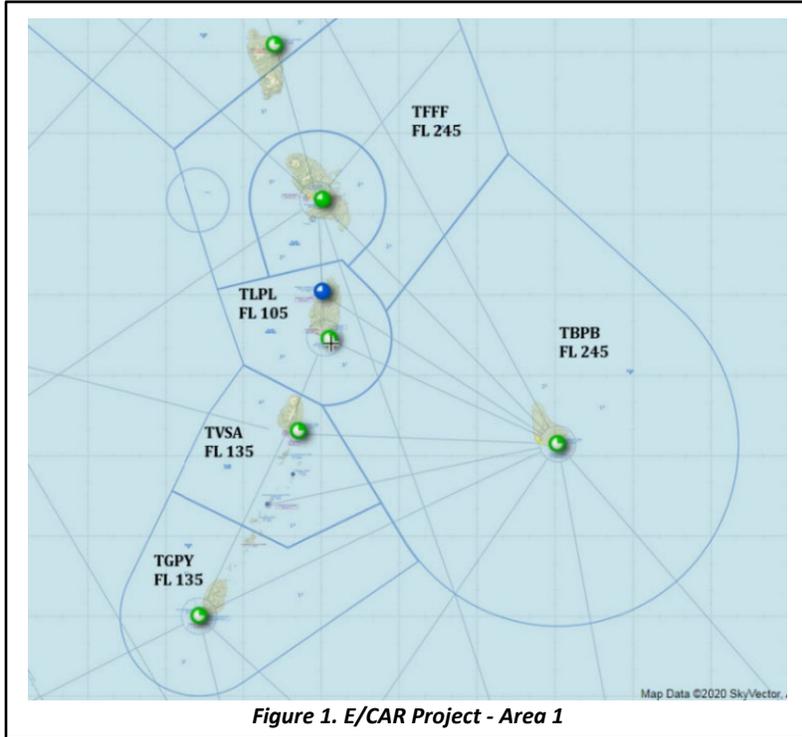
9.7 The scheduling for the delivery of PBN Briefing No. 2 will be discussed following the completion of the first Briefing.

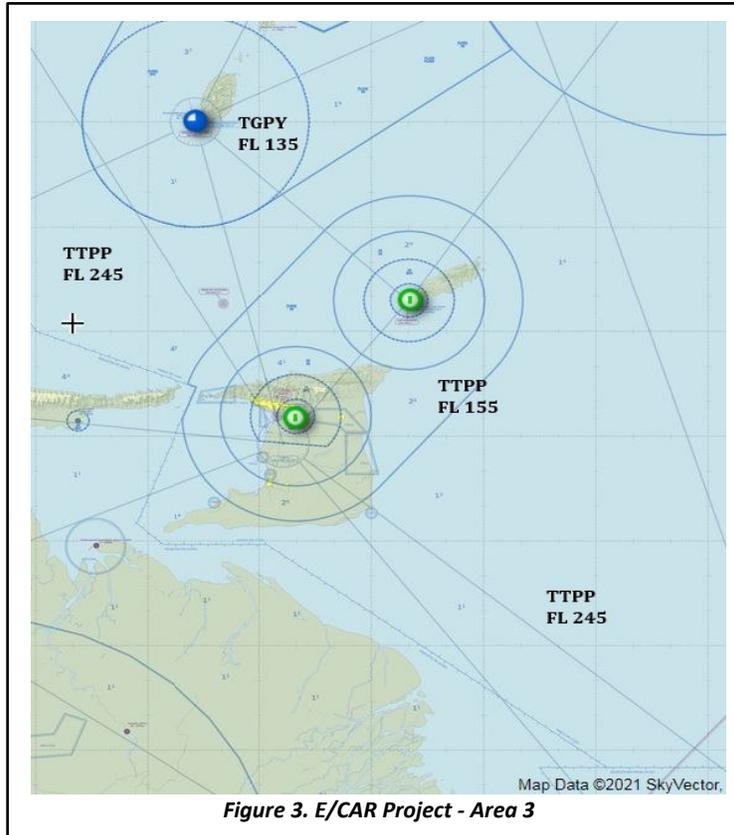
10. Suggested Actions

10.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) participate in activities related to the PBN Harmonization plan for the Piarco FIR within the Eastern Caribbean; and
- c) discuss any relevant matters as appropriate.

APPENDIX A
AREAS IDENTIFIED IN THE PIARCO FIR AIRSPACE CONCEPT PROJECT





APPENDIX B
PROPOSED FEEDER ROUTES WITHIN AREA 1 OF THE PIARCO FIR

