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**Tenth North American, Central American and Caribbean Working Group Meeting (NACC/WG/10)**  
Tulum, Mexico, from 8 to 12 September 2025

**Agenda Item 4: Presentation of NACC/WG Task Forces**

**PROJECT ELABORATION OF CONOPS ON NAVIGATION AID SYSTEMS IN THE CAR REGION**

(Presented by NAV-Adhoc Group)

**EXECUTIVE SUMMARY**

Under the MCAAP Program, assistance to the CAR States to develop a CONOPS on the use of conventional aids and GNSS was approved. At the MEVA/TMG/38 meeting (July 2023, Mexico), the Radio Aid Support Subgroup was created.

The project responds to the increase in air traffic and the obsolescence of navigation systems.

Deficiencies were identified: environmental vulnerability, land constraints, lack of spare parts, high inspection costs and shortage of technical personnel. There is also interest in processes of retiring old radio-aids.

CONOPS will address VOR/DME, ILS/LOC, DME/DME, SBAS and GBAS. It will include criteria for rationalization, renovation and dismantling of equipment.

The development of a Minimum Operational Network (MON) for GNSS contingencies is proposed.

The scope covers FIRs from Mexico, Central America and the Caribbean, including ANSPs, airfields and operators. The work phases run from September 2025 to February 2026, the results will be presented at GREPECAS in March 2026

<b>Action:</b>	Suggested actions under item 8
<i>Strategic Objectives:</i>	<ul style="list-style-type: none"><li>• Safety</li><li>• Air Navigation Capacity and Efficiency</li><li>• Economic Development of Air Transport</li><li>• Environmental Protection</li></ul>
<i>References:</i>	<ul style="list-style-type: none"><li>• Invitation – Workshop on Air Navigation Systems for the NAM/CAR/SAM regions Mexico City, Mexico, September 2-4, 2025</li></ul>

## **1. Introduction**

1.1 Under the Multi-Regional Assistance Program for Civil Aviation (MCAAP), the initiative of Assistance to CAR States for the development of the Regional Tasks of Radio Aids for Air Navigation Systems was approved, specifically the development of CONOPS for the use of Conventional Aids to Navigation and GNSS in the CAR Region.

1.2 During the MEVA/TMG/38 Meeting, held from July 11 to 14, 2023, in Mexico City, the Sub Support Group for Radio Aids to Air Navigation Systems was created.

## **2. Justification of the Project**

2.1 Several States in the CAR region have reported an increase in operations at their international airports, along with the need to expand their operational capacity. In addition, part of their air navigation infrastructure is reaching the end of its useful life, so they require short-term technical analyses to determine the best options for modernizing their air navigation systems, which strengthen the safety of current operations and support future operations, growing demand and new technology, both on the ground and on board aircraft.

2.2 States have identified some shortcomings in the operation of radio aids conventions, such as:

- Some facilities remain vulnerable to environmental hazards (e.g., tropical cyclones).
- The mountainous/rugged terrain imposes constraints on the optimal location of conventional aid systems and affects their performance, often necessitating operational constraints.
- Insufficient spare parts for timely repairs.
- Parts procurement is often a lengthy process that leads to loss of redundancy or equipment out of service.
- Periodic in-flight inspection missions are costly.
- Difficulties in attracting qualified technical personnel and providing specific training on the equipment to allow for required preventive and corrective maintenance.
- Replacing legacy systems often faces lengthy procurement processes and long lead times.

2.3 There is an interest on the part of the Member States in knowing the procedures for dismantling old radio aids.

2.4 GNSS and its enhancements offer safety, capacity and efficiency improvements in all phases of flight, so a regionally harmonised approach is required to modernise navigation services while maintaining resilience and continuity of operations.

### **3. Objective of the Project**

3.1 Provide a common operational concept (CONOPS) for planning, implementing and operating conventional aids and GNSS-based services in the CAR region, aligned with the provisions of ICAO and the GANP, which will include the following aspects:

- Define service and performance needs for en-route, terminal and approach navigation throughout the region.
- Describe an integrated infrastructure concept that combines conventional radio aids (VOR/DME, DME, ILS/LOC and DME/DME where warranted) and GNSS (SBAS, GBAS).
- Establish guidelines for the development of a resilient Minimum Operational Network (MON) of conventional systems to ensure continuity during GNSS degradations or unavailability.
- Provide criteria and processes for the rationalization, renovation and decommissioning of radio aids consistent with safety and operational needs

### **4. Scope and Applicability**

4.1 The geographical scope covers the FIRs of Central America, Mexico and the Caribbean. Applicability includes aeronautical authorities, ANSPs (including sub-regional providers such as COCESNA), aerodrome operators, airlines and general aviation. CONOPS addresses en-route, terminal and approach operations, including contingency operations.

### **5. Concept and Architecture of the Infrastructure to be considered in CONOPS**

#### 5.1 Conventional aid

- Rationalized VOR/DME network, with selective retention of ILS/LOC at high-benefit airports.
- DME/DME capability where cost-effective, enhanced through sites and optimized targeted DME coverage to support operations.

#### 5.2 GNSS-based services

- Use of SBAS where there is coverage of the service and equipment on board; monitoring of developments for SBAS options adapted to the CAR/SAM region.
- Consideration of GBAS at major airports with capacity and environmental benefits; Safety cases should address equatorial ionospheric effects where appropriate

## 6. Concept of Minimum Operational Network (MON) for the CAR Region

6.1 CONOPS shall establish a guide for the development of a Minimum Operational Network (MON) for navigation and approach "safety net" that allows safe operations and recovery from unavailability or local interference of GNSS, as well as during transition/degradation events. Its description is contained in Appendix A to this study note.

The following design principles will be considered:

- Coverage objective: aircraft must be able to navigate using VOR/DME and/or DME/DME to at least one "MON airport" with a conventional approach procedure (ILS/LOC or VOR/DME).
- Redundancy: avoiding single points of failure; Maintain dual equipment at key nodes

## 7. Activities for the Preparation of the Regional CONOPS

7.1 The following is the schedule of activities for the development of the project:

Fase	Dates	Principal Activities
Workshop and Planning	2–5 Sept 2025	Participate in the NAM/CAR/SAM Workshop (Mexico City). Coordination and planning meeting.
Virtual Work I	1–30 Oct 2025	Compile inventory of existing navigational aids, assess needs of States, prepare draft database.
Face-to-face work (NACC Office)	20–30 Nov 2025	Consolidate parameters (VOR, DME, GBAS, SBAS), write Technical Guide, integrate WG comments.
Remote Consolidation	1–15 Dic 2025	Refine the draft Technical Guide, incorporate feedback from States, prepare interim progress note.
Virtual Work II	25–30 Ene 2026	Finalize technical sections, integrate GANP v8 ASBU analysis, validate with the States.
Final Review and Delivery	1–28 Feb 2026	Final editing, prepare GREPECAS documentation package (Guide, WP, presentation), ICAO validation.

## 8. Suggested actions

8.1 The meeting is invited to:

- Take note of the information presented in the present study note;
- That the NACC/WG seek the support and provision of the information required for the project by the NACC/WG;
- That ATM groups within the NACC/WG provide and work closely with the project to achieve the expected objectives; and
- Any other action needed.

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## **APPENDIX A**

### **Minimum Operational Network (MON)**

The MON is a "backup network" of conventional radio aids (mainly VOR/DME, DME/DME and ILS/LOC at some strategic airports) that remains in operation even though the main navigation system is GNSS. Its purpose is to:

- Ensure operational continuity in case of GNSS unavailability (interference, degradation, attacks, satellite failures).
- Provide aircraft with an alternative and resilient means of navigating to a safe airport with published approach procedures.
- Avoid single points of failure and maintain redundancy in key locations.

#### 1. Cover Design:

The MON network is planned so that any aircraft that loses GNSS can navigate to at least one "MON airport" within its FIR, using conventional radio aids.

#### 2. Equipment selection:

Only the most strategic and reliable conventional aids are retained (e.g. route and approach VOR/DME, ILS at high-benefit airports, and DME stations distributed to support DME/DME).

#### 3. Principles of redundancy:

- It avoids depending on a single critical station.
- Dual equipment is installed in key nodes to maintain continuity.

#### 4. Operational Application:

- Under normal conditions, operations are mainly carried out with GNSS.
- In the event of loss of GNSS, pilots follow MON procedures based on radio aids, allowing the flight to continue safely.

#### 5. Scope of use:

- Coverage in route, terminal and approach.
- Use in contingencies, degradations or interferences.

MON functions as a regional safety net, ensuring the resilience of air navigation during contingencies, maintaining confidence in operations even in scenarios of temporary loss of GNSS.