International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)

WORKING PAPER

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Fifth GREPECAS–RASG-PA Joint Meeting (GREPECAS-RASG-PA/5) and Twenty-Third Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/23)

Virtual Phase (Asynchronous, 19 January to 17 February 2026)
In-Person Phase (Mexico City, Mexico, 4 to 6 March 2026)

Agenda Item 8: CAR/SAM Air Navigation Implementation

COOPERATION AND JOINT ADVANCES IN CAR AND SAM NAVIGATION

(Presented by Secretariat)

EXECUTIVE SUMMARY

In compliance with GREPECAS Conclusions 21/10 and 21/12, this paper presents the joint progress of the CAR and SAM Regions in GNSS-based air navigation during the 2024–2025 biennium, under the leadership of the NACC and SAM Regional Offices. Progress focused on strengthening operational resilience by mitigating the Global navigation satellite system (GNSS) interference, developing a Minimum Operational Network (MON), and strengthening regional coordination and planning, in line with the guidance of the ICAO Assembly and the Global Air Navigation Plan (GANP), Eighth Edition.

Action:	Actions suggested under item 4 of this study note.
Strategic Objectives 2026-2050:	• Every flight is safe and secure • Aviation is environmentally sustainable • Aviation delivers seamless, accessible, and reliable mobility for all • No country left behind • The International Civil Aviation Convention and Other Treaties, Laws and Regulations Address All Challenges • The Economic Development of Air Transport Assures the Delivery of Economic Prosperity and Societal Well-Being for All
References:	• Tenth meeting of the North American, Central American and Caribbean Working Group, NACC/WG/10, September 2025. • Thirty-third meeting of the SAM Region Implementation Group, SAM/IG/33, August 2025 • Twenty-first Meeting of the Regional Planning and Implementation Group for CAR and SAM, GREPECAS/21, November 2023 • Outcomes and guidelines from the 42nd ICAO Assembly

1. Introduction

1.1 In compliance with GREPECAS Conclusions 21/10 and 21/12, the ICAO NACC and SAM Regional Offices continue to strengthen interregional cooperation in the field of navigation, with the aim of increasing the resilience, continuity and operational safety of air navigation services in the CAR and SAM Regions. See **Appendix A** with follow up on the Conclusions.

1.2 The growing dependence on GNSS-based navigation systems, together with the increase in intentional and unintentional interference events (jamming and spoofing), has highlighted the need to adopt a coordinated regional approach to mitigate these risks and ensure the continuity of navigation services.

1.3 In this context, activities carried out during the 2024–2025 biennium have focused on strengthening GNSS resilience, implementing and validating a Minimum Operational Network (MON), monitoring and analysing GNSS interference, and strengthening regional navigation planning and coordination mechanisms, in line with the guidelines of the latest ICAO Assembly and GANP (Doc 9750) – Eighth Edition.

2. CAR/SAM Navigation Activities (2024–2025)

2.1 During the period 2024–2025, the CAR and SAM Regions developed a set of activities aimed at strengthening air navigation infrastructure, with a special emphasis on GNSS resilience and operational continuity, including:

a) Regional actions to monitor, analyse and mitigate GNSS interference (RFI), including the exchange of technical information and best practices among States.
b) Development and validation of a Minimum Operational Network (MON), based on conventional ground-based aids, as a contingency mechanism in the event of GNSS signal degradation or loss.
c) Strengthening regional air navigation planning, in line with GREPECAS Project A2, including consideration of GNSS augmentation systems and navigation service continuity strategies.
d) Consolidation of the regional Frequency Finder tool to support the management and protection of the aeronautical radio spectrum associated with navigation systems.

2.2 These activities contribute directly to improving operational safety and the resilience of air navigation services in both regions.

2.3 GNSS Resilience and Minimum Operational Network (MON): In compliance with GREPECAS Conclusions 21/10 and 21/12, the CAR and SAM Regions continue to make progress in developing regional strategies aimed at ensuring the continuity of air navigation services in the event of GNSS signal degradation or loss. These strategies include the definition, validation and progressive implementation of a Minimum Operational Network (MON), as well as the strengthening of GNSS interference monitoring and analysis capabilities, in line with the guidelines of the ICAO Global Roadmap on GNSS Interference Mitigation and the conclusions of the latest ICAO Assembly.

2.4 CAR/SAM regions began the first phase of analysis and technical discussions of the MON, which defines the minimum network of DME/DME and VOR aids necessary to sustain safe operations during GNSS interruptions. At the same time, CAR strengthened coordination with the United States Federal Aviation Administration (FAA), COCESNA and CARSAMMA for interference monitoring and standardisation of detection protocols (RFI Monitoring).

2.5 These actions are complemented by joint exercises and the exchange of technical information at the regional level, in line with the ICAO Global Roadmap on GNSS RFI Mitigation.

2.6 The CAR and SAM regions continue to consolidate the use of the Frequency Finder tool as a regional instrument for the management and protection of the aeronautical spectrum associated with navigation. In parallel, ICAO HQ is developing an improved version of the tool, scheduled for implementation from 2026.

2.7 The tool is fully operational and in use by CAR/SAM States for interregional coordination of the aeronautical spectrum.

3. Outcomes of the NACC/SAM Workshop on Radio Navigation (RDNVW2025)

3.1 In compliance with GREPECAS Conclusions 21/10 and 21/12, ICAO organised the NACC/SAM Workshop on Radio Navigation (RDNVW2025), held at the NACC Regional Office (Mexico City, 2–4 September 2025). Thirty-four delegates attended in person and 87 participated virtually, representing 28 States and Territories from the NAM/CAR/SAM Regions, along with four international organisations and six industry delegations.

3.2 The objective of the workshop was to raise awareness of the growing impact of GNSS signal interference and spoofing (RFI and Spoofing) on the safety and efficiency of air navigation, as well as to promote the exchange of experiences, best practices and mitigation technologies. Throughout the sessions, relevant developments were presented (See **appendix B**).

3.3 The workshop concluded with a regional consensus on the need to:

1. Implement national RFI reporting and mitigation procedures, in line with Doc 9849 and AN-Conf/14.
2. Maintain a Minimum Operational Network (VOR/DME/ILS) to ensure continuity in the event of GNSS loss.
3. Promote GNSS authentication technologies (OSNMA, SBAS) and ARAIM services.
4. Strengthen the protection of the aeronautical spectrum in view of WRC-27.
5. Encourage technological innovation through UAS, advanced sensors and automated monitoring.

3.4 The workshop represented a decisive step towards the consolidation of a unified inter-regional policy on GNSS resilience and spectrum protection, strengthening NACC/SAM cooperation and aligning national actions with the ICAO global roadmap and GREPECAS objectives.

4. Suggested Actions

4.1 The Meeting is invited to:

a) Take note of the progress made by the CAR and SAM Regions in implementing the GREPECAS Conclusions related to Air Navigation, in particular those related to GNSS resilience and continuity of navigation services.

b) Recognise the importance of strengthening regional actions to mitigate GNSS interference (jamming and spoofing), in line with the guidelines issued by the latest ICAO Assembly.

c) Support the continuity of joint CAR/SAM technical activities during 2026 aimed at strengthening GNSS resilience and the progressive implementation of a Minimum Operational Network (MON).

d) Invite the NACC and SAM Regional Offices to continue reporting to GREPECAS on the progress of regional navigation activities, in accordance with GANP (Doc 9750) – Eighth Edition.

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APPENDIX A

FOLLOW-UP ON CONCLUSIONS AND ACTIVITIES RELATED TO NAVIGATION (CAR/SAM)

Technical Area	Associated GREPECAS Conclusions	Title/Activity	Purpose and description	Expected Impact	Level of compliance	Forecast/ Horizon	Follow-up / Observations
Navigation (GNSS/MON)	21/10 – 21/12 – 21/24	GNSS Resilience and Minimum Operational Network (MON)	Ensure the continuity of air navigation services in the event of GNSS interference or loss.	Improved security and operational continuity.	ongoing	2026	Activities aligned with GREPECAS Project A2 and ICAO Assembly guidelines.
Navigation/Spectrum	21/12	Frequency Finder	Support the management and protection of the aeronautical spectrum associated with navigation.	Harmonised use of spectrum.	ongoing	2026	A consolidated and evolving regional tool.

Appendix B

NACC/SAM Workshop on Radio Navigation (RDNVW2025)
NACC Regional Office (Mexico City, 2–4 September 2025).

Relevant developments

a) GNSS Resilience and MON Network: Brazil presented its NAV MON Plan, which rationalises VOR/DME networks and combines DME/DME/Inertial to maintain RNAV 5 operations during GNSS failures. This model aligns with the SAM strategy and constitutes a benchmark for the future MON NAM/CAR/SAM.

b) Interference mitigation: EUROCONTROL and the FAA described the evolution of GNSS interference in Europe and America, highlighting the need for a multi-level response based on the implementation of Complementary PNT (C-PNT) and Resilient Operational Network (NAV-RON), combined with standardised reporting policies, operational training and civil-military cooperation.

c) ICAO roadmap: the Secretariat presented the ICAO Global Roadmap on GNSS RFI Mitigation, which sets specific milestones: implementation of iPack packages (2025), SBAS Authentication validation (2027), GNSS authentication (2029–2030) and DFMC GNSS operation (2032–2035).

d) Space/Satellite, and ground-based augmentation SBAS/GBAS systems: The Dominican Republic shared its experience with the GBAS installed at Punta Cana International Airport (MDPC), which already allows GBAS landing system (GLS) approaches at multiple runway heads. At the same time, the SBAS LATAM group defined a governance framework and a regional roadmap for the implementation of SBAS Safety of Life (SoL) services.

e) Spectrum protection: ICAO stressed the importance of active participation by States in preparations for WRC-27, recalling that the defence of critical aeronautical bands is essential to preserve the safety and efficiency of CNS/ATM operations.

f) Innovation in inspections: EUROCONTROL and Techno Sky (ENAV Group) presented European experiences in the use of drones (UAS) for radio aid inspections (ILS, VOR, DME) in accordance with Doc 8071, which reduce costs, time and emissions, complementing traditional flight inspections.

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