



Agenda Item 6: Other Matters

IMPLEMENTATION OF PERFORMANCE-BASED COMMUNICATION AND SURVEILLANCE (PBCS) IN THE ATLÂNTICO FIR

(Prepared by Brazil)

SUMMARY

This Information Paper presents the PBCS operational concept and its implementation by Brazil in the Atlantic FIR (FIR SBAO), highlighting the expected operational benefits, the phased implementation plan by DECEA, and the fundamental role of SAM States in the PBCS monitoring cycle.

References:

- ICAO Doc 9869 – PBCS Manual, 2nd Edition
- ICAO Doc 10063 – Manual on Monitoring the Application of Performance Based Horizontal Separation Minima
- AIC-N 13/24 – Implementation of PBCS Concept in FIR SBAO, DECEA, 2024
- ICA 100-37 – ATS Services, DECEA

1. Background

1.1 The Atlantico FIR (SBAO) encompasses a vast portion of the South Atlantic, including key air routes, such as EUR/SAM corridor and AORRA. This region is marked by high traffic density, significant meteorological phenomena near the ITCZ, and operational constraints due to the lack of conventional VHF and radar coverage.

1.2 Currently, the minimum horizontal separations applied in this oceanic airspace are 10 minutes or 80 NM longitudinally (for aircraft at the same level and same direction), and 50 NM laterally. These conventional standards, while ensuring safety, restrict airspace capacity and limit flexibility for tactical management, especially during meteorological deviations.

1.3 To address this, the Brazilian ANSP (DECEA) is implementing the Performance-Based Communication and Surveillance (PBCS) concept, aligned with the recommendations of the Global Air Navigation Plan (GANP – Doc 9750) and the ASBU framework.

2. Analysis

2.1 PBCS Concept

2.1.1 The PBCS concept, as defined in ICAO Doc 9869, establishes required levels of Communication (RCP) and Surveillance (RSP) performance that, along with RNP navigation, support reduced horizontal separations. These separations are applied based on the certified performance of data link systems and aircraft avionics.

2.1.2 The PBCS concept is implemented through CPDLC and ADS-C, already available in the FIR SBAO.

2.1.3 To be eligible for PBCS separations, aircraft must declare in the flight plan RCP 240 (Required Communication Performance), RSP 180 (Required Surveillance Performance), RNP (Required Navigation Performance) 4 or RNP 10, and have certified FANS 1/A systems.

2.1.4 PBCS also requires a performance monitoring and reporting cycle to ensure continued operational safety effectiveness.

2.2 Benefits of PBCS Implementation

2.2.1 PBCS allows reduced lateral and longitudinal separation minima, increasing capacity and routing flexibility. It improves efficiency, reduced fuel consumption, lower CO₂ emissions, and cost savings for airspace users.

2.2.2 Brazil's ATC system has been enhanced to monitor and report Actual Communication Performance (ACP) and Actual Surveillance Performance (ASP), emit alerts and generate data link performance non-compliance reports, according with ICAO Doc 9869. All these tools assist in identifying aircraft eligibility, performance deviations, and operational conformance in real-time, contributing to increased safety and situational efficiency in complex traffic environments.

2.2.3 The PBCS framework ensures that communication, navigation and surveillance capabilities meet consistent, performance-based standards, reducing latency in controller-pilot exchanges (RCP) and enhancing aircraft position accuracy (RNP and RSP). These improvements along with new PBCS-related functionalities into the ATC system support faster and more accurate decision-making and strengthen system resilience.

2.2.4 Additionally, the PBCS concept promotes interoperability among regions and stimulates global harmonization by applying standardized performance criteria defined in ICAO Annexes, Doc 9869 - PBCS Manual and Doc 10037 - Global Operational Data Link Document (GOLD).

2.3 Brazil's National Plan for PBCS Implementation

2.3.1 Brazil is advancing the implementation of PBCS-based separation within the Atlantico FIR under the framework of the SIRIUS Brazil Programme — a national initiative aimed at modernizing Brazilian airspace management. As part of this plan, Brazil intends to apply reduced separation minima based on RCP240 and RSP180 specifications by 2026, by ICAO global provisions and regional performance targets.

2.3.2 A three-phased implementation approach was adopted to manage the significant reduction in longitudinal separation minima.

Phase 1: The initial phase will commence in 2026 with a “5-minute longitudinal separation minima” and a lateral separation of 50 NM. (between pairs of aircraft with certified PBCS avionics, RNP4 or RNP10 capability and PBCS-approved crews)

Note: In the event that at least one of the aircraft does not meet the PBCS and PBN performance requirements, the separation will remain at 10 min. longitudinal and 50 NM lateral.

Phase 2: The second phase will introduce a longitudinal separation of 30 NM and a lateral separation of 23 NM, further enhancing the efficiency of airspace use through distance-based separation criteria. (between pairs of aircraft with certified PBCS avionics, RNP4 capability, and PBCS-approved crews)

Note: When at least one of the aircraft, despite being declared PBCS, does not have PBN RNP4 navigation capability, the separation of 5 longitudinal minutes and 50NM lateral will be applied.

Phase 3: The third phase will implement longitudinal separation minima based on distance using the ADS-C Climb and Descend Procedure (CDP), procedure in which, when an aircraft on the same route is authorized to climb or descend across the level of another aircraft, the longitudinal distance between them may be further reduced (up to 12NM).

2.3.3 The transition between phases is expected to take approximately three months, contingent upon successful adaptation to the new separation methods and the new tools available in the ATC system HMI update.

2.3.4 This strategic objective reflects Brazil’s commitment to enhance airspace efficiency and safety in remote/oceanic area. The plan encompasses technical, operational and regulatory preparations, including ATC system upgrades, development of operational procedures and coordination with international stakeholders and regional bodies.

2.3.5 Furthermore, Brazil is actively working on establishing national mechanisms for data link and operator compliance with PBCS specifications monitoring, ensuring that the entire system meets the conditions necessary for the application of the concept and, thus, the benefits are maximized. The plan also includes engagement with the ICAO South American Regional Office and the ICAO SAT group to ensure harmonization and interoperability with adjacent regions. This initiative positions Brazil as a key contributor to the implementation of ICAO’s Global Air Navigation Plan (GANP) and the regional performance framework.

2.4 **PBCS Monitoring Programme and the Role of State Participation**

2.4.1 Effective implementation of PBCS depends on the system readiness, operator compliance and also on a robust and collaborative monitoring program involving all key aviation stakeholders.

2.4.2 This program comprises avionics certifications, operator approval, data collection and analysis, incident reporting and periodic performance assessments.

2.4.3 The monitoring cycle operates at multiple levels:

- Tactical (Real-time) – performed by the ATC System through system functionalities and alerts;
- Local/National (Post-operation) – conducted by ANSPs to assess the performance of communication and surveillance infrastructure (e.g., ACP/ASP reports); and
- Regional and Global – coordinated by ICAO - recognized Monitoring Agencies, to identify trends, validate aircraft capability, and ensure system-wide conformance.

2.4.4 The main objectives of the monitoring activities are:

- a) to verify ongoing compliance with RCP and RSP specifications;
- b) to detect anomalies in system performance that could compromise safety;
- c) to maintain a reliable registry of aircraft/operator eligibility for PBCS operations;
- d) to support decision-making on airspace planning and separation application.

2.4.5 The stakeholders involved in the monitoring cycle include Air Navigation Service Providers (ANSPs), Civil Aviation Authorities (CAAs), Aircraft Operators, Regional Monitoring Agencies (RMA), such as the CAR/SAM Regional Monitoring Agency (CARSAMMA), Communication Service Providers (CSPs) and Avionics Manufacturers.

2.4.6 DECEA, as the Brazilian ANSP, will be responsible for reporting operational performance data, including instances of non-compliance with RCP and RSP specifications (e.g., RCP 240, RSP 180). The CAR/SAM RMA receive and analyse this data, coordinating with State authorities and other RMAs, when necessary, to investigate anomalies, validate operator approvals, and recommend mitigation measures. States, in turn, are expected to ensure that their operators are appropriately authorized and compliant with PBCS requirements, as defined in ICAO Doc 9869.

2.4.7 For the SAM Region, the active participation of all States in providing data, sharing operational feedback, and cooperating with regional monitoring processes is critical to the long-term success and safety of PBCS operation.

2.4.8 Regional harmonization is crucial for achieving the full benefits of PBCS. As the EUR/SAM corridor spans multiple FIRs, operational and monitoring coordination among SAM States is required. Monitoring of large lateral and longitudinal deviations, as well as RCP/RSP compliance, should be part of a coordinated regional framework, ensuring data sharing and common procedures.

2.4.9 The engagement of SAM States is essential to the success of this concept. States are encouraged to designate Points of Contact (PoCs) to liaise with the RMA and support the timely exchange of data and approvals. Additionally, States should ensure their regulatory frameworks support PBCS oversight. Participation in ICAO forums where regional safety data, trends and mitigation strategies are discussed is relevant.

2.4.10 Brazil underscores the importance of regional coordination in sustaining an effective PBCS monitoring system. By actively participating in this process, States enhance the overall performance and safety of operations within the SAM region, contributing to a globally harmonized air navigation system.

2.4.11 The successful implementation of PBCS in the SAM region requires not only technical readiness and regulatory alignment but also a sustained and collaborative effort among all regional stakeholders. Brazil's plan to implement PBCS-based operations in the Atlantico FIR demonstrates its commitment to advancing global aviation goals and contributing to enhanced operational performance.

3. **Suggested actions**

3.1 The Meeting is invited to:

- a) Encourage airlines using the Atlantic FIR airspace to seek PBCS certification of avionics and operational approval of crews;
- b) encourage air operators to declare existing PBCS and PBN capabilities in their flight plans, in order to support continuous monitoring of fleet compliance;
- c) encourage States to actively participate in the PBCS monitoring programme and designate appropriate Points of Contact (PoCs) to the ICAO CAR/SAM Regional Monitoring Agency (RMA) to support related coordination activities; and
- d) support the establishment of sustained collaboration mechanisms among CAR/SAM stakeholders to facilitate the safe and efficient implementation of performance-based separation minima in the Region and ensure the harmonized and continued application of the PBCS;