



## INTERNATIONAL CIVIL AVIATION ORGANIZATION

### WESTERN AND CENTRAL AFRICA OFFICE

#### Twenty-fourth Meeting on the improvement of Air Traffic Services over the South Atlantic (SAT/24)

Luanda, Angola, 3-7 June 2019

**Agenda Item: 3.5**

**PBCS Implementation and Monitoring**

#### **PBCS IMPLEMENTATION OVERVIEW**

(Presented by the FAA)

<b>SUMMARY</b>
This paper provides an overview of the items under agenda item 3.5, and references for more detailed information.
The meeting is invited to note the information.
<b>COORDINATION</b>
<b>REFERENCES</b>
ICAO Annex 11 ICAO Doc 4444, PANS-ATM ICAO Doc 9869, Edition 2, PBCS Manual, RTCA DO-306/EUROCAE ED-122, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR)
*Principal references

## 1. INTRODUCTION

1.1 The performance-based communication and surveillance (PBCS) framework defines the performance and safety requirements applicable to the end-to-end communication and surveillance capabilities that enable application of a particular air traffic management operation, e.g. a separation standard. It encompasses the elements of compliance for an air traffic service provider (ATSP) to provide

services that include the respective operation as well as the compliance of an aircraft operator (including associated aircraft equipage) to be eligible for those services.

1.2 There are separate PBCS responsibilities for the State concerning the regulatory policy for the ATSP versus that for the aircraft operators. Each State should assess which responsibilities may be applicable to their operators and which may be applicable to the ATSP(s) under their jurisdiction.

1.3 In the case of RCP240 and RSP180, only few States have ATSPs that conduct operations dependent upon meeting the safety and performance requirements defined. Conversely, most States have aircraft under their jurisdiction that fly in airspace in which operations are conducted with performance-based separations. The aircraft must have State authorization for RCP240 and RSP180 to be eligible for these separations.

1.4 This paper provides specific references in ICAO documentation for the State in terms of requirements and the guidance to support determination of compliance for an ATSP and aircraft operator.

## 2. DISCUSSION

2.1 ICAO Annex 11, *Air Traffic Services*, provides the PBCS responsibilities applicable to air traffic services.

- Paragraph 2.8.1 and 2.8.2 discuss the prescription of RCP.
- Paragraphs 2.9.1 through 2.9.3 discuss the prescription of RSP.
- Paragraph 3.3.5.2 discusses the monitoring requirements for RCP and RSP.

2.2 ICAO Doc 4444, *Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM)* specifies the required communication performance (RCP) and required surveillance performance (RSP) when applicable.

- Paragraph 5.4.1.2.1.6 provides the lateral separation minima for which RCP and RSP are currently applicable.
- Paragraph 5.4.2.9.2 provides the longitudinal separation minima for which RCP and RSP are currently applicable.

2.3 ICAO Doc 9869, Edition 2, PBCS Manual provides the guidance material to support compliance with these requirements. It should be noted that the PBCS Project Team under the ICAO Communications Panel Operational Data Link Working Group (CP-OPDLWG) is currently working on a proposal for amendment, which will produce Edition 3. For further information, to provide comments against Edition 2, or to review the draft document, please contact the PBCS PT lead, Theresa Brewer, [theresa.brewer@faa.gov](mailto:theresa.brewer@faa.gov).

- Appendix A of the ICAO Doc 9869, Edition 2, PBCS Manual contains a check list of the specific tasks that are relevant for each stakeholder, i.e. State, ATSP, Operator during an implementation of the PBCS framework for a particular ATM operation.
- Appendices B and C contain the full set of safety and performance requirements that must be met by the ATSP (including CNS system), aircraft operator, aircraft system, and communication service provider (CSP) for each defined RCP and RSP, respectively.

It is important to note the relationship between the performance and safety requirements (*RTCA DO 306/EUROCAE ED 122, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace - Oceanic SPR Standard, October 2007*). The safety requirements define the risk mitigation strategies to achieve the safety objectives, and the performance requirements are defined taking the safety objectives into consideration. The safety and performance requirements are met through system design of the CNS infrastructure, and in some cases through procedures for ATC and the flight deck.

- Chapter 4 provides guidance on compliance with an RCP and/or RSP.

*4.1.2 Initial compliance provides a level of confidence that the system component will perform in accordance with its allocation provided by the RCP/RSP specification and will not compromise the overall performance of the operational system. Since the initial compliance for a system component is not exhaustive, the PBCS monitoring programmes provide a higher level of confidence that the operational system will continue to meet the RCP/RSP specification.*

- Section 4.2 provides guidance on State responsibilities.
  - Paragraph 4.2.2 discusses responsibilities for States having jurisdiction over ATSPs that provide ATM operations having RCP/RSP requirements (e.g. performance-based separation minima).
  - Paragraph 4.2.3 discusses responsibilities for States having jurisdiction over aircraft operators that require authorization for RCP/RSP to be eligible for a particular ATM operation (e.g. performance-based separation minima).
- Section 4.3 provides guidance for States on initial compliance determination and related approvals.
  - Paragraph 4.3.1 pertains to the ATSP.
  - Paragraph 4.3.3 pertains to the aircraft system and paragraph 4.3.4 pertains to the aircraft operator.
- Section 4.5 provides guidance on the monitoring programmes at both the local and regional levels. Appendix A of this paper provides the current draft revision for section 4.5.3 which contains guidance on the regional monitoring program, which will also be discussed at the upcoming meeting of the regional monitoring agency (RMA) coordination group (CG).
- Appendix D provides details on how to execute the local and regional monitoring.

### 3. ACTION BY THE MEETING

- 3.1 The meeting is invited to note the content of the paper.

## Appendix A. DRAFT proposal for amendment to section 4.5.3 of ICAO Doc 9869, PBCS Manual

### 4.5.3 Regional PBCS monitoring programme

*Guidelines for these monitoring programmes can be found in the Manual on a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (Doc 9574), the Manual of Operating Procedures and Practices for Regional Monitoring Agencies in Relation to the Use of a 300 m (1 000 ft) Vertical Separation Minimum above FL 290 (Doc 9937) and the Manual on Monitoring the Application of Performance-based Horizontal Separation Minima (Doc 10063).*

4.5.3.1 A regional PBCS monitoring programme should be established to enable:

- a) sharing of information related to regional processes, tools, and points of contact;
- b) transparent reporting, investigation and resolution of problems identified within the aircraft systems, ground systems, and network systems and their respective components;
- c) standardized reporting of ACP, ASP and Availability for the region;
- d) maintenance of records for aircraft authorized for the RCP and RSP specifications applicable in the region;
- e) auditing to verify approval status of aircraft indicating an RCP and/or RSP in flight plans;
- f) communication with the appropriate parties when the operational system does not meet the relevant RCP/RSP specification; including
  - i. the relevant ANSP, when the non-compliance concerns a subsystem of the infrastructure, including the CSP, under its control; and
  - ii. the relevant operator and the State of the Operator or the State of Registry when the non-compliance concerns the operator, or any aircraft type or individual aircraft within its fleet.

(new paragraph) The regional PBCS monitoring programme may be facilitated by one entity or through cooperation of multiple entities, and should provide flexible services and centralized support to accommodate specific local, regional and global needs. Figure 4-1 provides a model for the regional PBCS monitoring programme.

(formerly paragraph 4.5.3.10) The regional PBCS monitoring programme should coordinate with and draw on the experience, existing processes and communication networks of other regional monitoring programmes, such as those established for monitoring RVSM, performance-based horizontal separation minima, and safety of ATM operations. (See relevant guidance material in the *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive* (Doc 9574), the *Manual of Operating Procedures and Practices for Regional Monitoring Agencies in Relation to the Use of a 300 m (1 000 ft) Vertical Separation Minimum above FL 290* (Doc 9937) and the *Manual on Monitoring the Application of Performance-based Horizontal Separation Minima* (Doc 10063).)

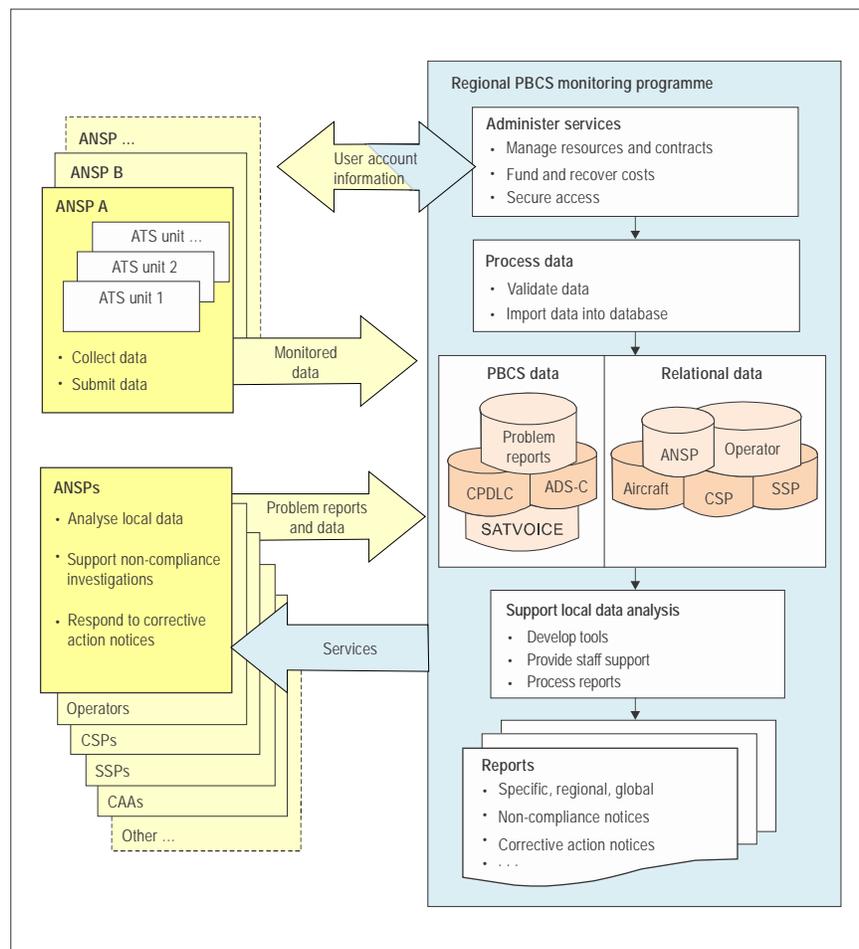
4.5.3.2 The entity or entities facilitating the regional PBCS monitoring programme should have processes and agreements/contracts in place to manage resources, fund and recover costs, and secure access to services and information for the relevant stakeholders, e.g. State authorities, ANSPs, aircraft operators, CSPs, SSPs, aircraft manufacturers, equipment suppliers.

4.5.3.6 The regional PBCS monitoring programme should provide a forum for users to develop and share tools, in order to facilitate the conduct of a specific analysis on selected data or to automatically query a database and send non-compliance and corrective action notices to appropriate parties.

4.5.3.3 The regional PBCS monitoring programme should establish a process that enables users, such as ANSPs, aircraft operators, CSPs, aircraft manufacturers, equipment suppliers and other participants, to submit or access information. This process may include issuing a user ID and password associated with a unique security profile to users requesting an account. For example, a user may:

- a) submit problem reports;
- b) submit data or information that supports the analysis, investigation and resolution of problem reports;
- c) submit performance data (e.g. summary reports or PBCS CSV data files, as necessary);
- c) access relational databases which provide information specific to an operator, aircraft type, ANSP, CSP or message type; and
- d) access standardized reports, such as compliance summary reports for management, civil aviation authorities (CAAs) or regional groups on an as-needed basis.

4.5.3.4 When the regional PBCS monitoring programme includes submissions of raw data, it should include a process to validate submitted data before importing it into a secure centralized database, and desensitize data



consistent with non-disclosure and security policies established for defining the security profile of authorized users.

Figure 4-1. Regional PBCS monitoring programme overview

4.5.3.6 The regional PBCS monitoring programme should provide a means for users to develop and share tools, in order to facilitate the conduct of a specific analysis on selected data or to automatically query a database and send non-compliance and corrective action notices to appropriate parties.

4.5.3.7 The regional PBCS monitoring programme should provide staff support to assist ANSPs and other participants to investigate problems and conduct local and regional analyses.

4.5.3.8 The regional PBCS monitoring programme should manage problem reports, including:

- a) provide a means to receive, track and manage problem reports (e.g. web-based service);
- b) request data from relevant sources;
- c) coordinate the problem investigation and assign appropriate entities to assist in the analysis;
- d) provide a diagnosis of the problem and recommend resolutions; and
- e) inform the originator of the problem report on status and closure of the problem.

(new paragraph) The regional PBCS monitoring programme should develop a tracking system to catalogue existing problems and their resolution status, including a listing of high priority issues in terms of impact to controller workload and safety hazard, and a listing of recommended software versions by aircraft type.

4.5.3.9 The regional PBCS monitoring programme should support participating ANSPs in the analysis and reporting of operational data, including ACP, ASP and availability data, at the regional level. Support activities include:

- a) coordinate, as requested by the participating ANSPs, the analysis of degraded performance and availability issues most common within the region or globally; and
- b) produce regional PBCS monitoring reports in accordance with established procedures for receiving ANSP-monitored information and report formats provided by the participating ANSPs;

4.5.3.11 The regional PBCS monitoring programme should ensure a communication process that includes notification of the appropriate parties when the operational system does not meet the RCP/RSP specification, and indication that corrective action has been taken.

*Note.— For aircraft non-compliance, the State of the Operator or the State of Registry may be notified through the RMA communication network, since each State is assigned to an RMA.*

4.5.3.12 The regional PBCS monitoring programme should coordinate the global exchange of monitoring information in accordance with the guidelines provided in section 4.5.4.