



**SOUTH ATLANTIC IMPLEMENTATION MANAGEMENT GROUP
EIGHTH MEETING**

(virtual, 19-20 October 2026)

Agenda Item 2: Planning and implementation programmes

**IMPLEMENTATION OF ATS SURVEILLANCE ENHANCED PROCEDURAL
SEPARATION (ASEPS) IN THE DAKAR OCEANIC FIR (GOOO) USING SPACE-
BASED ADS-B**

(Presented by ASECNA)

SUMMARY

This working paper presents Advanced Surveillance-Enhanced Procedural Separation (ASEPS) implementation plan within the Dakar Oceanic (GOOO) FIR which has been benefiting from full surveillance coverage through the operational deployment of Space-Based Automatic Dependent Surveillance-Broadcast (SB ADS-B). This capability creates the opportunity to implement ASEPS concept in accordance with ICAO provisions contained in Annex 11 and the Procedures for Air Navigation Services - Air Traffic Management (Doc 4444).

Accordingly, this paper proposes the following:

- **Implementation roadmap:** a structured approach to implementing ASEPS in the Dakar Oceanic FIR.
- **Performance monitoring:** indicators to assess operational effectiveness and safety.

References:

- SAT SG/1 SoD
- ICAO Doc 4444, Doc 9869, Doc 9613 and Annex 11

ICAO strategic goals:

- Air Navigation Capacity and Efficiency
- Safety
- Environmental Protection

1. Introduction

1.1 Space-Based ADS-B (SB ADS-B) has been operationally implemented in the Dakar Oceanic FIR since **19 May 2022**, after a satisfactory experimental phase launched in 2020. Coverage of the oceanic FIR is complete.

1.2 ADS-B is an ATS surveillance system. It is automatic, as no flight crew or Controller action is required for the information to be transmitted, and dependent, as the surveillance information is derived from the aircraft's navigation system.

1.3 This paper aims to capitalize on, and optimize the use of, SB ADS-B by introducing ATS surveillance-based separation (ASEPS) in the GOOO oceanic upper airspace, where direct controller-pilot VHF voice communication is not available.

1.4 Historically, air traffic services within the oceanic portion of the Dakar Oceanic FIR have relied on procedural control techniques supported by position reporting and data link communications. While these methods have ensured safe operations, they impose separation constraints that limit operational flexibility and airspace capacity.

1.5 The operational deployment of Space-Based ADS-B surveillance throughout the FIR provides continuous surveillance coverage and enables the introduction of ATS Surveillance Enhanced Procedural Separation (ASEPS) as foreseen by ICAO provisions.

1.6 ASEPS allows the application of reduced separation minima in oceanic and remote airspace where surveillance services are available but direct VHF communications may not be continuously available, thereby providing significant operational and environmental benefits.

1.7 Operational statistics indicate very high levels of aircraft equipage with ADS-B, RNP4 and FANS 1/A CPDLC capabilities, demonstrating that the majority of traffic operating in the Dakar Oceanic FIR is already capable of supporting ASEPS operations.

1.8 The implementation of ASEPS will contribute to enhanced safety, increased capacity, improved flight efficiency and reduced environmental impact while supporting the regional introduction of reduced separation minima with the implementation of Performance-Based Communication and Surveillance (PBCS) in the ESC.

1.9 ASEPS will give air traffic controllers more planning and tactical options in oceanic airspace. It will allow operators greater flexibility for severe weather avoidance, and to request and receive new oceanic routes, optimized speeds and flight level changes.

- 1.10 The expected benefits are:
- lower fuel consumption and CO₂ emissions;
 - improved safety;
 - more capacity in the EUR/SAM airspace and improve routing flexibility;
 - higher user satisfaction;
 - facilitation of accommodation of future traffic growth.

2. Discussion

ICAO Regulatory Framework

2.1 The ICAO Global Air Navigation Plan (GANP) encourages the implementation of advanced surveillance and communication technologies to improve operational performance and airspace efficiency.

2.2 Amendment incorporated in ICAO provisions permit the application of ATS surveillance separation minima in oceanic airspace supported by suitable surveillance, navigation and communication performance.

2.3 Amendment 9 to the 16th edition of ICAO Doc 4444 (PANS-ATM), applicable from 5 November 2020, introduced ATS surveillance separation minima where VHF voice communication is not available as follows:

8.7.4 Separation minima using ATS surveillance systems where VHF voice communications are not available:

8.7.4.1 Where direct controller-pilot VHF voice communications are not available, separation minima described in 8.7.4.2, 8.7.4.3 and 8.7.4.4 may be applied utilizing positioning information derived from an ATS surveillance system, provided the following requirements are met:

- a) a navigational performance of RNP 4 or RNP 2 shall be prescribed;*
- b) the communication system shall satisfy RCP 240;*
- c) an alternate means of communication shall be available so as to allow the controller to intervene and resolve a conflict within a total time of nine minutes, should the normal means of communication fail; and*
- d) route conformance monitoring shall be ensured by the use of ATS surveillance system lateral deviation alerts with a warning threshold normally set at a maximum 3.0 NM.*

2.4 The operational environment currently available in the Dakar Oceanic FIR through SB ADS-B, CPDLC and HF communications provides the foundation for meeting these requirements.

2.5 The four requirements of **8.7.4.1** are linked to other ICAO material, which this paper uses as the basis for implementation:

8.7.4.1 condition	Related ICAO provision	Implication for GOOO
a) RNP 4 or RNP 2	Doc 9613 (PBN Manual); PBN/L1 (RNP 4) in Item 18 of the flight plan, Doc 4444 Appendix 2	Prescribe RNP 4 or RNP 2 in the AIP for the airspace where ASEPS is applied
b) RCP 240	Doc 9869 (PBCS Manual); Doc 10037 (GOLD); P2 in Item 10 and SUR/RSP180 in Item 18 of the flight plan	Aircraft must be declared and authorized for RCP 240; this is the main limiting factor (paragraph 2.9)
c) Alternate means, 9-minute intervention time	Doc 4444 Chapter 8 (8.7.4.1 c); Doc 10037 (GOLD), HF and SATVOICE procedures	HF is the alternate means; its ability to meet the 9-minute intervention time must be demonstrated and monitored
d) Route conformance, 3.0 NM	Doc 4444 Chapter 8 (8.7.4.1 d)	Lateral deviation alerts to be configured and verified in the ATM system
ATS surveillance	Annex 10 Vol. IV (ADS-B 1090 MHz); Doc 9924 (Aeronautical Surveillance Manual); B1/B2 in Item 10 of the flight plan	SB ADS-B provides the position source; coverage of the whole FIR
Safety assessment	Annex 11, Chapter 2 (safety management); Annex 19; Doc 9859 (Safety Management Manual)	A safety assessment is required before the minima are applied

Operational Readiness – Aircraft equipage

2.6 Operational equipage statistics collected between January and September 2026 demonstrate a high level of readiness among operators using the Dakar Oceanic FIR.

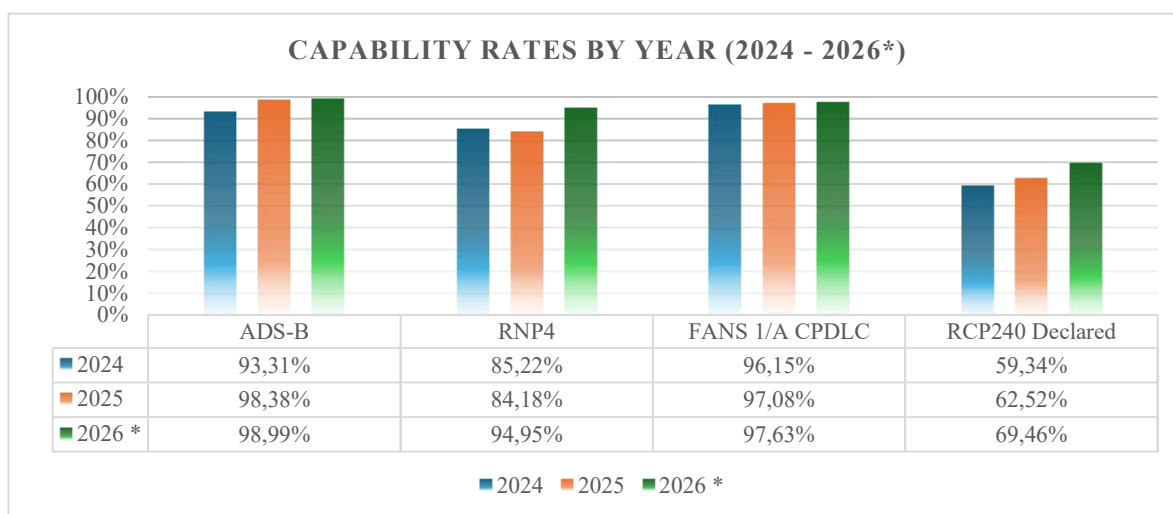
2.7 The statistics show that ADS-B equipage has reached almost universal levels among aircraft operating in the FIR, increasing from 93.31% in 2024 to 98.99% in 2026.

2.8 RNP4 capability exceeds 94% of aircraft movements while FANS 1/A CPDLC compliance exceeds 97%, confirming the maturity of navigation and communication capabilities required for ASEPS.

2.9 RCP 240 is the exception. It rose by 10.1 points since 2024 but is still at 69.46%. Since RCP 240 requires CPDLC, the aircraft in the 28.2-point difference with CPDLC are capable of data link but have no RCP 240 declared. This is mainly due to incomplete flight plan filing (the P2 designator in Item 10), given the modern fleet operating in the upper airspace. As these figures come from flight plan data, they show what is declared, not what the aircraft can do.

2.10 The publication of regional PBCS requirements and associated operator awareness campaigns for ASEPS operations implementation in Dakar Oceanic FIR is expected to further increase declared RCP240 compliance.

2.11 The equipage levels demonstrate that a substantial proportion of the traffic operating in the Dakar Oceanic FIR is already capable of benefiting from ASEPS.



* 2026 data extraction from 1st of January to 31st of September

Applicable separation minima

2.12 The minima provided in Doc 4444, 8.7.4.2 to 8.7.4.4 for ASEPS operations are shown below. They apply only to aircraft that meet all four conditions of 8.7.4.1:

Airspace	Surveillance Systeme	Communication	Navigation	Longitudinal minimum	Lateral minimum
Airspace where	Required	Primary: CPDLC (RCP 240)	RNP 4 or RNP 2	17 NM between aircraft on the same	19 NM between parallel or non-

Airspace	Surveillance Systeme	Communication	Navigation	Longitudinal minimum	Lateral minimum
VHF is not available		Alternate COM required		track or on intersecting tracks at an angle of less than 90° (14 NM where the angle is less than 45°)	intersecting tracks (15 NM where the conditions of 8.7.4.3 are met)

2.13 To ensure harmonization with Phase 2 of the PBCS implementation, ASECNA intends to apply the following separation minima within the Dakar Oceanic FIR:

- **Longitudinal separation:** 30 NM;
- **Lateral separation:** 23 NM;
- **Climb and descent separation:** 20 NM.

2.14 As shown in the table below, these values exceed the minima specified in the preceding table. They therefore remain within the provisions of paragraph 8.7.4.

Airspace	Surveillance	Communication	Navigation	Longitudinal minimum	Lateral minimum
GOOO oceanic FIR	SB ADS-B	Primary: CPDLC (RCP 240). Alternate: HF	RNP 4 or RNP 2	- 30 NM between aircraft on the same track or on intersecting tracks at an angle of less than 90° - 5 NM between opposite direction aircraft on reciprocal tracks when aircraft have passed each other	23 NM between parallel or non-intersecting tracks

2.15 Current practice is 10 minutes (about 80 NM) with MNT. A 20 NM minimum is a reduction of about 62%, which is what makes more flight level changes, optimum speeds and weather deviations possible in the ESC.

2.16 Aircraft that do not meet the requirements, for example those without RCP 240 declared in the flight plan, remain under the current procedural separation (10 minutes with MNT). ASEPS therefore applies flight by flight, and the benefit grows with the share of eligible traffic.

Safety, SLOP and contingency arrangements

2.17 In addition to the separation minima reduction, and to enhance safety in the Dakar oceanic FIR, pilots are urged to apply **SLOP as published in ASECNA AIP ENR 1.8**, in compliance with the Doc 4444 (PANS-ATM) provisions.

2.18 A safety assessment covering the hazards, risk and mitigations of the ASEPS minima must be completed before application, in line with Annexes 11 and 19 and Doc 9859.

2.19 The assessment should include the effect of CPDLC or SB ADS-B degradation, and the 9-minute intervention requirement with HF.

2.20 In the event of SB ADS-B surveillance or CPDLC failure, or an aircraft does not meet the requirements, the controller reverts to the procedural separation in force (10 minutes with MNT). Controllers must be trained on these procedures before ASEPS is applied.

Implementation roadmap

N°	Implementation Activity	Target date
1	Development of ASEPS Concept of Operations (CONOPS)	On going
2	Validation of SB ADS-B surveillance performance requirements	13/12/2026
3	ATM system Configuration for the required route conformance monitoring alerts and validation	31/12/2026
4	Safety assessment including CAA approval	31/01/2027
5	Publication of operational requirements and procedures	04/02/2027
6	Controller training and operational familiarization	19/03/ 2027
7	Operational Manual update and LoA Assignment to reflect ASEPS operations	19/03/ 2027
8	Safety review and readiness verification	25/03/2027
9	Full ASEPS implementation	April 2027
10	Continuous performance monitoring	Continuous

Monitoring mechanism and reporting

2.21 Following implementation of ASEPS, a monitoring programme should be established.

2.22 Because PBCS and ASEPS share largely the same elements, ASEPS monitoring and reporting should follow the PBCS Monitoring and Reporting Guidance developed by SATMA. Under this framework, the Dakar ACC will report non-compliance with RCP 240 requirements, together with service-availability data and other elements.

2.23 The following additional elements should also be monitored:

Monitoring element	Data or events monitored	Monitoring and reporting frequency
Aircraft equipage	Proportion of flights equipped with ADS-B, RCP 240, RNP 4, and CPDLC, based on flight-plan data	Monitored monthly; reported at each SAT IMG meeting
Flight-plan quality	Flights with CPDLC capability for which RCP 240 is not declared, with feedback provided to operators	Monitored monthly; reported at each SAT IMG meeting
ASEPS application	Number of flights reverted to MNT	Monitored monthly; reported at each SAT IMG meeting
Datalink service availability	CPDLC failures, use of HF as an alternate means of communication, and intervention time (target: 9 minutes or less)	Monitored and reported monthly
Safety occurrences	Losses of separation, ACAS events, and pilot or controller reports, managed in accordance with local SMS	Each event; reported to CAA

3. Action by the Meeting

3.1 The meeting is invited to:

- a) note the level of readiness of the Dakar Oceanic FIR for the implementation of ATS Surveillance Enhanced Procedural Separation (ASEPS);
- b) recognize the high levels of ADS-B, RNP4 and CPDLC equipage demonstrated by aircraft operating within the FIR;
- c) support the operational implementation of ASEPS within the Dakar Oceanic FIR based on Space-Based ADS-B surveillance and the proposed roadmap;
- d) discuss any relevant matter and give directions as deemed necessary.

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