



Agenda Item 3: Activities and deliverables Report – GT Interop and Subgroups

**PHASED OPERATIONAL IMPLEMENTATION OF CONTINENTAL
ADS-B IN BRAZILIAN AIRSPACE**

(Prepared by Brazil)

SUMMARY

This paper outlines Brazil's phased strategy for implementing ADS-B surveillance in continental upper airspace. The plan includes deploying a nationwide network of 1090 MHz Extended Squitter (1090 ES) ADS-B ground stations, gradually increasing the operational use of surveillance data, and allowing both equipped and non-equipped aircraft to operate until February 2030. This approach aims to deliver immediate operational benefits while ensuring a smooth transition to mandatory ADS-B Out DO-260B equipage requirement.

References:

- Doc 9871 – Technical Provisions for Mode S Services and Extended Squitter
- Doc 4444 – Procedures for Air Navigation Services Air Traffic Management (PANS-ATM)
- Circular 326 – Assessment of ADS-B to Support Air Traffic Services and Guidelines for Implementation

1. Background

1.1 Brazil is modernizing Air Traffic Management by deploying a nationwide ADS-B surveillance system across the continental upper airspace using 1090 MHz Extended Squitter ground stations. This initiative aims to improve surveillance, increase airspace capacity, and enhance operational efficiency.

1.2 The implementation strategy ensures a gradual transition to ADS-B surveillance, giving aircraft operators time to upgrade avionics and benefit from expanded coverage.

2. Analysis

2.1 Brazil is implementing a phased strategy that includes deploying a nationwide network of ground stations, progressively integrating ADS-B surveillance into ATC services, and gradually transitioning to mandatory ADS-B operations without segregating airspace for equipped and non-equipped aircraft.

2.2 The ADS-B network is expected to provide surveillance coverage over the entire Brazilian continental upper airspace above FL245 and will be fully deployed by 2027 and in 8 February 2030, aircraft operating in the continental upper airspace at FL245 and above will be required to carry ADS-B OUT 1090 ES equipment compliant with RTCA DO-260B (or later approved versions).

2.3 Until the ADS-B mandate takes effect, aircraft equipped with different ADS-B avionics versions (RTCA DO-260, DO-260A, and DO-260B), as well as those without ADS-B, will continue to share upper airspace. This mixed-fleet approach allows operators to upgrade gradually while preserving operational flexibility and equitable access to Brazilian airspace.

2.4 Although the mandatory ADS-B equipage requirement will only take effect in 2030, significant operational benefits will be realized throughout the implementation program. From the initial deployment stages, ADS-B surveillance will expand coverage in areas with limited number of radars, provide additional surveillance redundancy, improve controllers' situational awareness, enhance Flight Information Service (FIS), increase surveillance accuracy and update rate, and strengthen ATC resilience.

2.5 This implementation program also includes the progressive enhancement of ATM automation systems to incorporate surveillance monitoring functions consistent with the principles established in ICAO Circular 326. These functions will continuously monitor ADS-B signal quality, integrity, continuity, update rate and accuracy, providing objective evidence to support operational approval of 5 NM surveillance separation in the upper airspace.

2.6 ADS-B surveillance information that does not satisfy the performance requirements for operational use in the provision of the applicable separation minima within the airspace concerned shall not be displayed on the ATC system.

2.7 The operational concept of the program establishes three categories representing increasing levels of ADS-B operational utilization:

Category 1 (CAT 1): ADS-B information is used exclusively for traffic monitoring, enhancement of controller situational awareness, and improvement of Flight Information Service. No ATS surveillance separation is provided using ADS-B data.

Category 2 (CAT 2): ADS-B data are integrated with radar surveillance. Radar remains the primary validation source, while the higher update rate and improved positional accuracy provided by ADS-B enhance ATS surveillance services and support surveillance separation through correlated surveillance information.

Category 3 (CAT 3): ADS-B becomes an operational surveillance source capable of directly supporting ATS surveillance separation in upper airspace where ADS-B equipage is mandatory. Operations require aircraft equipped with ADS-B OUT compliant with RTCA DO-260B or later versions.

2.8 Implementation has been divided into the following six progressive operational phases, considering the categories described in 2.6:

Phases I to III (2026–2027) focus on surveillance monitoring operations, beginning in the Curitiba and Brasília FIRs and progressively expanding to Recife and Amazon FIRs. During these phases, ADS-B is employed exclusively for traffic monitoring, to increase controller situational awareness and for Flight Information Service while surveillance performance evaluations are conducted and ATM functional requirements are refined.

Phases IV and V (2028): introduce operational integration of radar and ADS-B surveillance. ATM systems are enhanced to correlate and fuse surveillance information, enabling combined RADAR/ADS-B operations (CAT 2) in radar-covered upper airspace while maintaining CAT 1 operations elsewhere. These phases follow the surveillance monitoring phases and lead into combined radar and ADS-B operations.

Phase VI (beginning on 8 February 2030): introduces full operational ADS-B implementation in the Brazilian continental upper airspace. At this stage, CAT 3 operations become applicable above FL245, supported by RTCA DO-260B equipage, enhanced ATM system functionality, and continuous surveillance performance monitoring.

EA	Phase 1		Phase 2	Phase 3	Phase 4		Phase 5		Phase 6
	AUG 2026		MAR 2027	AUG 2027	MAY 2028		AUG 2028		FEB 2030
	FIR CW	FIR BS	FIR RE	FIR AZ	FIR CW	FIR BS	FIR RE	FIR AZ	Entire Continental EA
Above FL245	CAT 1	CAT 1	CAT 1	CAT 1	CAT 2	CAT 2	CAT 2	CAT 2	CAT 2
Below FL245 *	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1	CAT 2
EA NOT RADAR	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1

*Within airspace under the responsibility of ACCs

Figure 1 – Timetable of Operational Phases Deployment

3. Conclusion

3.1 The Brazilian implementation strategy demonstrates that nationwide ADS-B deployment can be achieved through a gradual, performance-based approach that maintains mixed-fleet operations, avoids mandatory segregation of airspace during the transition period and provides immediate operational benefits well before the ADS-B mandate enters into force.

3.2 The incorporation of ICAO Circular 326 surveillance monitoring principles into ATM systems will establish the technical foundation necessary for the safe future application of 5 NM surveillance separation and the continued evolution of performance-based ATM services in Brazil.

4. Suggested actions

4.1 The Meeting is invited to:

- a) note Brazil's phased strategy for implementing ADS-B 1090 ES surveillance by service providers in upper airspace;
- b) recognize the importance of service providers incorporating ICAO Circular 326 surveillance monitoring requirements into ATM systems to support future surveillance separation applications; and
- c) encourage States planning ADS-B implementation to consider phased deployment strategies that deliver immediate operational benefits and support a smooth transition to future ADS-B mandates.

END