

International Civil Aviation Organization

ICAO

**Twenty Ninth Meeting of the Communications/
Navigation and Surveillance Sub-group (CNS SG/29)
of APANPIRG**

Bangkok, Thailand, 16-20 June 2025

Agenda Item 8: Surveillance (8.2 Other surveillance-related matters)**ADS-B GNSS PERFORMANCE ISSUES IN AUSTRALIA**

(Presented by Australia)

SUMMARY

This paper describes recent unique ADS-B problems experienced in Australia, relating to interaction between avionics and Global Navigation Satellite Systems (GNSS), affecting some aircraft.

1 INTRODUCTION

- 1.1 Australia has experienced persistent intermittent ADS-B issues in airspace in the north-west and central Australia, impacting on some specific aircraft, which resulted in ADS-B tracks being dropped from air traffic controller screens.
- 1.2 The first issue is related to interaction between legacy avionics (DO-260 type) and regional Satellite-Based Augmentation System (SBAS) signals outside their validated service volume.
- 1.3 The second issue mainly affects Airbus A359 and A388 aircraft, whereby degraded GNSS satellite measurements by the aircraft avionics triggered low-integrity flag which set the NACp (Navigation Accuracy Category for Position) to zero in the ADS-B message.

2 DISCUSSION**Issue #1: FreeFlight Systems GPS/SBAS (DO-260)**

- 2.1 In early 2024, aircraft equipped with FreeFlight Systems 1203C GPS/SBAS sensors (DO-260 type) have been experiencing intermittent loss of ADS-B signals, particularly over the west coast of Australia. These occurrences, often observed in high-traffic zones, result in temporary track loss and have affected various aircraft types (e.g., F100, B190, BE20). Refer to Figure 1.

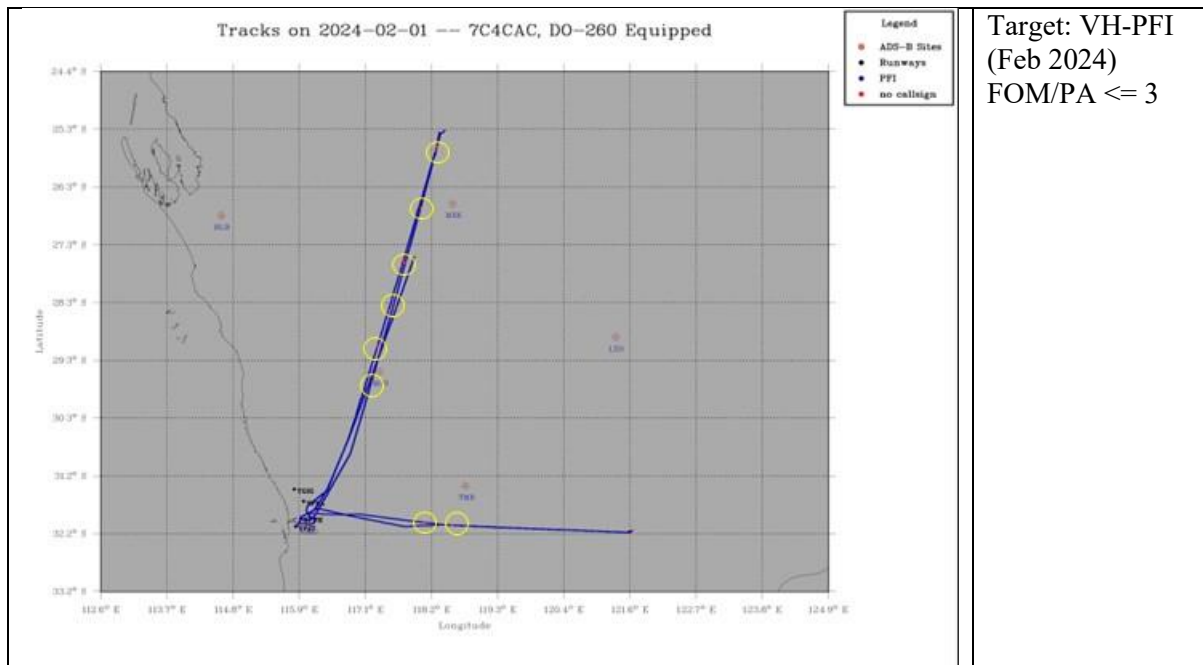


Figure 1 – Track drops on aircraft with legacy DO-260 avionics and interaction with SBAS.

2.2 The issue is prevalent among aircraft interacting with the Satellite-Based Augmentation System (SBAS) signals outside their validated service volume. The primary root cause is linked to the early operational activation of the Korean SBAS (KASS). The FreeFlight 1203C sensor, originally designed around SBAS constellations like WAAS, EGNOS, MSAS, and GAGAN, encounters discrepancies when interpreting KASS signal integrity—especially at higher elevation angles seen in Australia. The sensor can misinterpret SBAS Type 27 messages, leading to elevated Horizontal Protection Limit (HPL) values and degraded positional integrity.

2.3 Remedial activities: through collaboration between FreeFlight Systems (Avionics), the Australian Civil Aviation Safety Authority (CASA), and Airservices Australia (the ANSP), FreeFlight Systems has developed and certified system software update to address the KASS-related issues. The certified release of System Software is approved under TSO-C145c (Class Beta 1) and is currently being rolled out to operators of affected aircraft.

Issue #2: ADS-B drop-outs up on several Airbus A350/380 aircraft in central Australia.

2.4 Australia has experienced recurring loss of ADS-B surveillance in central and northern Australia affecting mainly Airbus A359 aircraft, with additional cases involving A388 and A35K aircraft. These events are characterised by GPS satellite signal degradation, potentially due to environmental or ionospheric anomalies, with the degradation of GNSS integrity leading to NACp values of Zero. The Airservices Australia air traffic management system does not display ADS-B tracks to controllers if the quality indicators do not meet a pre-defined threshold. Hence ADS-B positions with a NACp of zero will be discarded, leading to the corresponding track being dropped.



Figure 2 – A350/380 NACp=0 issue.

- 2.5 In some instances, the problem affected several Airbus A350/A380 aircraft in different locations at the same time. The GNSS integrity degradation occurs for durations ranging from several minutes and up to 45 minutes. Other aircraft in the vicinity of these aircraft were not affected.
- 2.6 Initial reports from Airbus indicate the most likely cause of the problem is due to the interaction between two airborne systems, the Air Data Inertial Reference Unit (ADIRU) and the Aircraft Environmental Surveillance System (AESS). In this event, once the ADIRU indicates a satellite included in the position computation is degraded, the AESS will set NACp to zero, even if the ADS-B position is considered valid in the position computation.
- 2.7 Airbus has advised ongoing monitoring of ADS-B surveillance loss events, especially following the September 2024 monitoring system update implemented across the A350 fleet. Analysis is also being extended to include the A380 fleet, where similar behaviors have been reported.
- 2.8 Airservices Australia (ANSP) in conjunction with the regulator CASA continues to monitor the issue and working with Airbus for a resolution. Airbus plans to integrate findings from these events into future ADIRU and AESS standards to enhance resilience against satellite signal degradation impacts.

3 ACTION BY THE MEETING

- 3.1 The meeting is invited to:
 - a) Note Australia’s ADS-B performance issues relating to interactions between avionics and Global Navigation Satellite Systems (GNSS).
 - b) Share similar experiences and discuss any relevant matters as appropriate.
