



*International Civil Aviation Organization*

**AUTOMATIC DEPENDENT SURVEILLANCE –  
BROADCAST SEMINAR AND TWELFTH MEETING  
OF AUTOMATIC DEPENDENT SURVEILLANCE –  
BROADCAST (ADS-B) STUDY AND  
IMPLEMENTATION TASK FORCE (ADS-B SITF/12)**



Kolkata, India, 15-18 April 2013

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**Agenda Item 5: ADS-B performance monitoring**

**PERFORMANCE MONITORING UPDATE**

(Presented by Australia)

**SUMMARY**

The purpose of this WP is to inform discussion on ADS-B Performance monitoring by highlighting the performance monitoring performed by Australia.

**1. Background**

ADS-B performance monitoring is conducted at a number of levels in Australia as described below.

**2. ADS-B Ground station performance monitoring**

Airservices Australia performs on-line real time performance monitoring of the ADS-B ground stations, supported by ADS-B system functionality as follows :

**2.1 Site monitoring**

An ADS-B signal is injected into the ADS-B antenna and the downstream processing checks whether the signal is received at the correct signal strength and whether the resulting ADS-B message is reliably received by the ATC system. In this way, receiver sensitivity and antenna cables etc are monitored real time.

This system also monitors the GPS health at the ADS-B ground station site and records any GPS events for logging and later analysis if required.

**2.2 Remote monitoring and Control**

A significant number of ground station parameters are monitored by the ADS-B ground station. If performance parameters exceed predefined thresholds, alerts are generated.

These parameters include:

- CPU process operation
- Temperature
- Asterix output load
- Time synchronization
- GPS status
- Power status
- Site monitor status

### 3. Logistics Support Monitoring

Airservices Australia records all failures, service outages and repair/ return to service times.

The number of failures and service restoration times are reported regularly to management - together with equivalent statistics for radars, nav aids and other facilities. Eg See Fig 1 below.

ADSB System Failures

Site	No. outages	Outage Time	MTT R	MTBO	Ao
AS	0	0	0		100.00 %
AYE	0	0	0		100.00 %
BDV	0	0	0		100.00 %
BGO	0	0	0		100.00 %
BHI	0	0	0		100.00 %
BKE	0	0	0		100.00 %
BLB	0	0	0		100.00 %
BRM	0	0	0		100.00 %
CAG	0	0	0		100.00 %
DGN	0	0	0		100.00 %
DSGK	1	27.19	27.19	8756.81	99.69%

Fig 1 : Typical report of ADS-B site system failures

### 4. ADS-B Avionics performance & statistics monitoring.

Airservices has developed tools to capture and report on the performance of avionics (See Appendix A for details). These tools remain in development and plans exist to further develop and improve analysis and reporting capabilities. In particular the following are provided regularly:

#### 4.1 Airframe data base

Each week, statistics are automatically extracted and emailed containing a list of airframes detected in the previous week. This includes :

- 24 bit code
- Associated Flight IDs used
- Min & Max FOM (NUC/NIC)
- Number of position “jumps”
- Number of zero integrity reports
- Registered operator & aircraft type (For Australian aircraft)
- ADS-B data version

Each week a brief manual examination of the data from each “not previously detected” aircraft is conducted. Aircraft which report NUC/NIC=0 are NOT examined because they are considered not equipped. The examination includes:

- a) the replay of at least one flight
- b) entering a screen capture of the replay into a database
- c) categorizing any deficiency identified (and hence identifying any “new” deficiency types).
- d) determination and entry of the operator , aircraft type, country of registry
- e) Examining the data for :
  - track consistency (lack of jumps, holes etc)
  - valid Flight ID
  - FOM (NUC/NIC) values
  - Presence of geometric altitude (indicates GPS equipage)
  - Presence and correctness of velocity vector
  - Correctness of 24 bit code (mainly correct code block)

#### **4.2 Flight plan capture**

Each month the processed flight plans are matched against the airframe database. Since all civilian flight plans include registration a linkage is possible to each airframe. This is used to determine the percentage of airframes that have conducted operations (in certain airspace/ or flight levels) with and without ADS-B.

#### **4.3 Australian Civilian register**

Each month the Civilian registry is matched against the airframe database and the flight plan capture. The percentage of airframes and flights that have been ADS-B equipped is monitored and reported.

#### **4.4 Airservices Systems Issue Database (ASID) database**

Airservices Australia maintains a corporate wide database that records and tracks deficiencies with the Air Traffic Management systems. It is used for example to record all identified software errors in the ADS-B ground stations, radars, and in the ATC automation system.

An new category of issue called “Surveillance Avionics” has been created within the ASID database so that avionics problems can be captured, managed and reported. The ADS-B Avionics performance tools provide support for those identifying and characterizing avionics errors (both deign errors and faults).

#### **4.5 Feedback to Airlines, Operators, Manufacturers & Industry**

The above processes and systems have been used to :

- a) Write to operators detected to have incorrectly operating equipment
- b) Advise the regulator of incorrectly operating equipment or pilot operation
- c) Provide warnings to operators regarding the pending ADS-B mandate if their fitment progress is considered inadequate.
- d) Write to relevant operators about correct entry of Flight ID
- e) Advise manufacturers and aircraft OEMs of issues
- f) Advise stakeholder groups including ICAO

**5. Conclusion**

The Meeting is invited to note the ADS-B Performance monitoring performed by Airservices Australia.

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**Appendix A : ADS-B Data Collection and Statistics reporting**

Airservices has developed tools to automatically capture all ADS-B data from ADS-B ground stations into the Corporate IT network, using a “TAP” to isolate it from the Operational network. In addition, tools allow users on the Corporate network to receive regular emails containing details of all aircraft received in the previous week, and to allow users to extract all data related to selected airframes, for individual analysis as required.

