

International Civil Aviation Organization



**AUTOMATIC DEPENDENT
SURVEILLANCE – BROADCAST SEMINAR
AND FOURTEENTH MEETING OF
AUTOMATIC DEPENDENT
SURVEILLANCE – BROADCAST (ADS-B)
STUDY AND IMPLEMENTATION TASK
FORCE (ADS-B SITF/14)**



Christchurch, New Zealand, 14 – 17 April 2015

Agenda Item 4: Review States' activities and interregional issues on implementation of ADS-B and multilateralism

UPDATE ON ATC SURVEILLANCE ACTIVITIES IN AUSTRALIA

(Presented by Australia)

SUMMARY

This paper provides information on air traffic control surveillance activities in Australia. The paper is an update of the reports previously provided.

1. Introduction

1.1 This paper provides information on air traffic management surveillance activities in Australia. The paper is an update of the reports provided previously.

2. Surveillance Projects – Status Update

2.1 Airservices is in the middle of a large capital program to deliver new surveillance infrastructure. The status of these projects has been reported in various details over the past few years. The current status of these projects is:

Radar Replacement

- All terminal area radars have been replaced with new primary and co-mounted Mode S (AMSTAR project). This includes the commissioning of additional (previously transportable) Mode S radar in Sydney (Cecil Park) to provide additional Primary and Secondary coverage for Sydney Terminal Area.
- The ERRP project is deploying new Mode S radars to replace Eight of Eleven existing en-route Mode A/C radars (SSR only). Five Mode S radars have now been commissioned. Four more (Macedon, Tabletop, Hann & Alma) are yet to be commissioned and two (Macedon & Hann) require transportable radars to be used during the transition.

- It is planned to decommission four radars in 2017 and replace these sites with ADS-B only following the ADS-B mandate (Feb. 2017)
- Data transport from the radar sites to the ATC centres will migrate from dedicated serial lines to an IP based network design over the next 3 to 5 years.

WAM

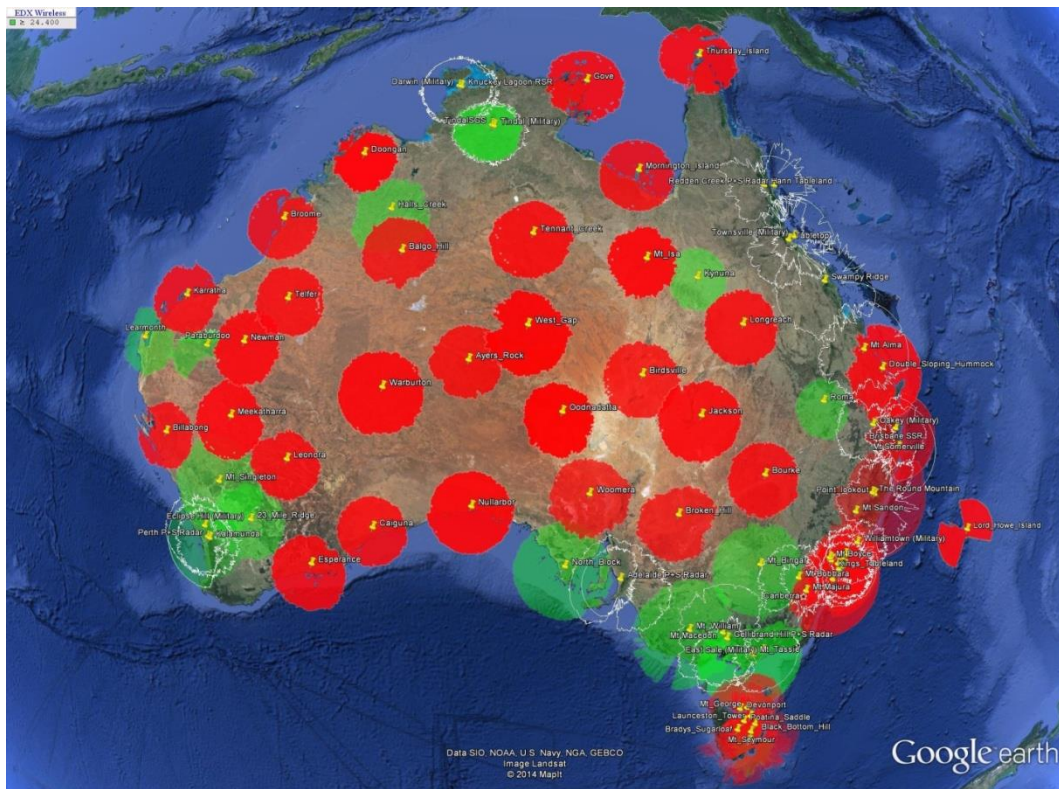
- WAM in Tasmania (TASWAM) has been operational since early 2010
- WAM in Sydney (SYDWAM) is operational in the terminal area supporting a 3NM separation standard and for Parallel Runway Monitor (PRM) application
- Currently there are no plans to deploy further WAM systems; the previously planned upgrade of the WAM system in Tasmania to include Higher Power Interrogators to extend coverage has been cancelled after a further cost-benefit analysis. The main factors involved were the upcoming 2017 IFR ADS-B mandate and the number of aircraft that are already ADS-B equipped.
- The planned software upgrade to support DO-260B has now been completed in Sydney WAM. ADS-B DO-260B is now supported by both WAM systems.

ASMGCS

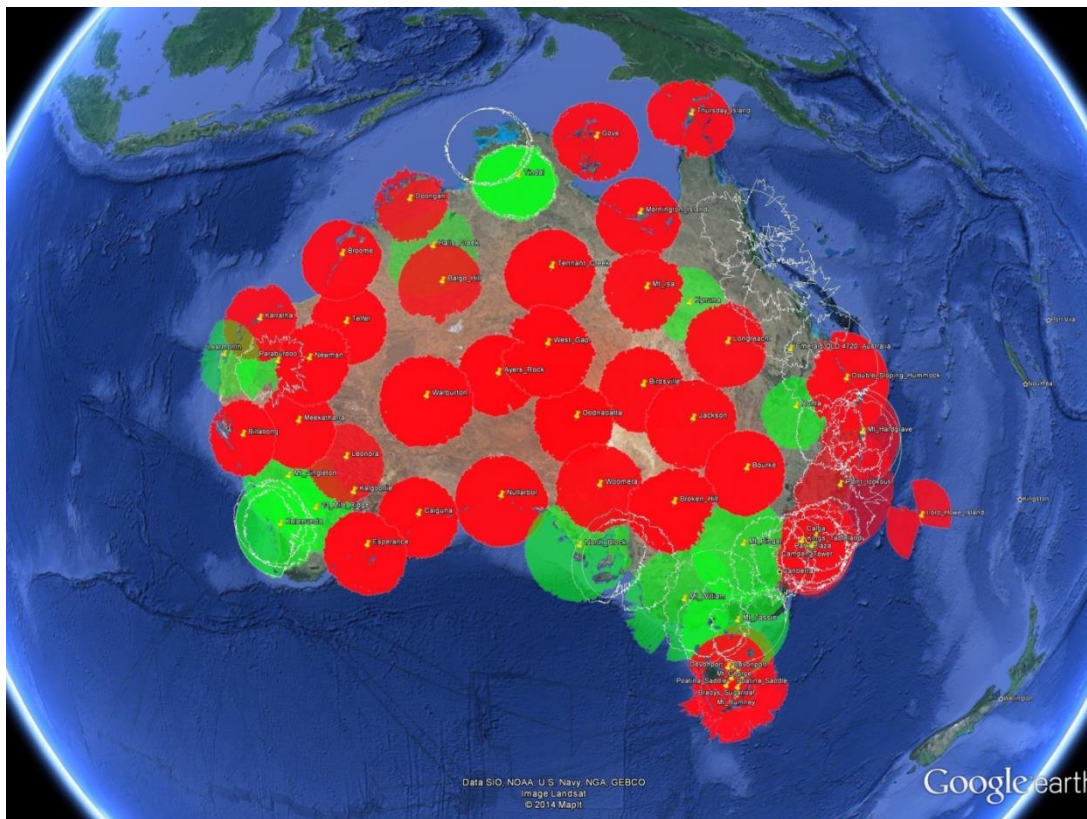
- Operational in Melbourne since December 2009, Sydney since May 2010 and Brisbane since January 2014.
- In Melbourne, the ground display is integrated into the tower automation system and operates as a “fused display” with the associated terminal area radar. This new architecture will also be rolled out in Brisbane and Perth as towers are upgraded.
- Perth system installation and testing has been extended and commissioning is now planned for April 2015

ADS-B

- 35 duplicated ADS-B sites are currently operational , plus ADS-B is received from two operational WAM systems
- A new project is currently installing 13 new ADS-B ground stations and to provide improved resilience of the digital communications network that transports the data from the remote ground stations to the ATC centres. The expected additional coverage is shown in the plots below (green shading). The project now expects to complete during 2015. Ground stations already operating include :
 - Learmonth
 - Mt William
 - Mt Tassie
 - Mt Singleton



5000ft coverage



10,000ft coverage

- A separate project is currently developing the concept for deploying ADS-B ground stations to offshore gas platforms in the Timor Sea north west of Australia to extend coverage beyond the mainland.
- A project to upgrade the Terminal Control Unit, Automation System to display and process ADS-B at Melbourne and Perth is in the design phase. ADS-B data will be converted to a radar Cat48 radar data stream. It is acknowledged that this methodology is sub-optimal but it has been chosen as a viable lower cost alternative during the interim period before the arrival of our new ATC automation system. This will provide an additional layer of surveillance in the terminal areas to supplement existing radar. Under this project it is planned that Airservices will use ADS-B data in the terminal area using a minimum 3 nm separation standard in 2016. Whilst a Safety Case has already been approved defining the NIC/NAC/SIL/NUC values to be used for a 3 nm separation standard in this environment, work is now under way to conduct the necessary Safety work associated with actually implementing the 3 nm standard in Australian TCUs.
- An ADS-B repeater prototype has been acquired and testing is complete. This is a stand-alone unit that re-transmits ADS-B messages on 1090MHz to nearby ground stations to provide additional coverage around obstacles like terrain without the need for an additional ground station. It is expected this could be used at Lord Howe Island or offshore.
- ADS-B data is now being displayed for situational awareness in 4 regional towers. This has been combined with the existing radar display to provide extended coverage for ADS-B equipped aircraft outside radar coverage. This will be extended to other towers as additional ADS-B ground stations are deployed.

Other Projects

- The Defence Radar Filter (DRF) Project has deployed computer-based processors and redundant communications that provide a centralised path for IP based radar data between Airservices and Defence. Defence operated radars that are used for Civilian ATC are progressively being transitioned to this new system.

3. Activation of ADS-B mandates and ADS-B Equipage Rates

3.1 Australia has successfully transitioned to mandatory ADS-B use at and above FL290 and the forward fit of ADS-B for new aircraft registrations in Australia.

3.2 The number of issues relating to ADS-B operations and the new mandates has steadily decreased as fitment of ADS-B has increased. CASA have provided exemptions for some aircraft for operations within the East Coast radar airspace and also in Oceanic airspace. These exemptions expire in November 2015.

The current fitment rates at/above FL290 are shown below :

| ADS-B Flights Planned Above FL285 | Feb 2015 |
|--|-----------------|
| Major Airlines | 99.4% |
| Biz Jets | 79% |
| Turboprops > FL285 | 91% |

The current status for ALL IFR aircraft at all flights levels is :

| ADS-B IFR Flights Planned | Feb 2015 |
|--|-----------------|
| Operations within 500 NM Perth (Feb 2016 Mandate) | 83% |
| All Australia (Feb 2017 Mandate) | 61% |
| All Australia IFR helicopter operations | 14% |

4. Transponder Regulations and Future Mandates

4.1 The following table provides a reference to all current and future requirements that are in current regulations relating to the carriage and use of surveillance transponders including Mode S and ADS-B. No further changes are being planned at this stage.

| Effective Date | Surveillance | Mandate | Status |
|------------------------|---------------------|---|---|
| 9 Feb 2012 ✓ | Mode S | Forward Fit – Mode S capable aircraft must support Flight ID Applies to – <ul style="list-style-type: none">new aircraft on register from 9 Feb 2012 If DAPS are transmitted they must be in accordance with Annex 10 | Regulation (CAO 20.18) IN EFFECT NOW |

| | | | |
|---------------------------------|---------------|---|---|
| <p>12 Dec 2013 ✓</p> | <p>ADS-B</p> | <p>All aircraft operating at FL290 and above must be fitted with ADS-B OUT</p> <p><i>Exemptions are granted for operations within the east coast radar coverage areas and Oceanic airspace until November 2015.</i></p> <p><i>Exemptions have not been granted by CASA for operations across the continent outside of radar coverage.</i></p> | <p>Regulation (CAO 20.18) (CAO 82.1/3/5)</p> <p>IN EFFECT NOW</p> |
| <p>6 Feb 2014 ✓</p> | <p>Mode S</p> | <p>Forward Fit – Aircraft with transponder requirement (operations in Class A,B,C,E and G above 10,000ft) must be fitted with Mode S transponder with ADS-B capability (not necessarily the GNSS position source)</p> <p>Applies to –</p> <ul style="list-style-type: none"> • new aircraft on register from 6 Feb 2014 and • new transponder installations in existing aircraft requiring a transponder after 6 Feb 2014 | <p>Regulation (CAO 20.18)</p> <p>IN EFFECT NOW</p> |
| | <p>ADS-B</p> | <p>Forward Fit - IFR aircraft must be fitted with ADS-B OUT</p> <p>Applies to –</p> <ul style="list-style-type: none"> • new aircraft on register from 6 Feb 2014 | |
| <p>4 Feb 2016</p> | <p>Mode S</p> | <p>All aircraft operating at Melbourne, Sydney, Perth & Brisbane aerodromes must be fitted with Mode S transponder with ADS-B capability (to support ASMGCS)</p> | <p>Regulation (CAO 20.18)</p> <p>Regulation (CAO 20.18)</p> |
| | <p>ADS-B</p> | <p>All IFR aircraft operating within 500 Nm East/North of Perth must be fitted with ADS-B OUT</p> | |
| <p>2 Feb 2017</p> | <p>ADS-B</p> | <p>All IFR aircraft must be fitted with ADS-B OUT (now applies to domestic and foreign registered aircraft)</p> | <p>Regulation (CAO 20.18) (CAO 82.1/3/5)</p> |

4.2 CASA has now released Notice of Final Rule Making (NFRM) 1305AS which extends the 2017 IFR ADS-B mandate to foreign aircraft as well via Civil Aviation Orders that provide operating requirements referenced in foreign Air Operator Certificates (CAO 82.1, CAO 82.3 and CAO 82.5).

The next significant date will be the introduction of a mandate for the carriage and use of ADS-B for all aircraft operating within 500NM East/North of Perth to enhance ATC services in Western Australia and for all aircraft operating at AMSGCS airports to have Mode S. This applies in Australian airspace (domestic and foreign aircraft) from **4th February 2016**.

4.3 Mode S equipage at the major airports where a Mode S transponder will be required from 4th February 2016 has recently been examined. The percentage of flights that are already Mode S equipped is high however there remain a number of smaller operators that have multiple aircraft to upgrade prior to this mandate.

4.4 Flight Plans and Mode S radar detections in the period 1/1/2014 to 1/8/2014 were analysed with the following results:

| Departure Airport | Brisbane YBBN | Melbourne YMML | Perth YPPH | Sydney YSSY |
|---|--------------------------|---------------------------|-----------------------|------------------------|
| % of Flight Planned Flights with Mode S declared in Flight Plan (L,S,E,H or P) | 91.5% | 99.6% | 94.0% | 97.3% |
| % of Flight Planned Flights detected as Mode S by radar | 90.7% | 99.6% | 94.3% | 98.2% |

4.5 The analysis above also highlights the significant number of flight plans that do not correctly indicate the Mode S capability of the aircraft. We will continue to promote and provide assistance to operators in preparation for these mandates.

5. Operational Use of Flight ID from radar

5.1 Flight ID from surveillance is provided to the ATC system from ADS-B ground stations and the WAM system in Tasmania. Recently this has been expanded to include the WAM system in Sydney. The ATC system performs flight plan coupling using this identification. While Mode S radars are configured to extract this information from aircraft, it is not yet distributed to the ATC system due to a large number of aircraft observed to have this information incorrectly configured.

5.2 Over many months data has been collected from individual radars and a communication campaign has been conducted directly with operators to advise them of incorrectly configured aircraft and remind them of the current requirements to have Flight ID set based on Aircraft Identification in submitted flight plans or registration. This activity has significantly reduced the number of errors observed and has supported the transition to the use of Flight ID from all radars.

5.3 During the initial transition which commenced in Adelaide (February 2014) processing issues with VFR traffic were observed that generated nuisance alarms for controllers so the use of Flight ID in these sectors was put on hold. At this stage these issues have not yet been resolved. The transition to full operational use of Flight ID will be resumed as soon as this issue is resolved.

6. SkySafe Enhancements and use of DAPS

6.1 A special taskforce called SkySafe was convened to look at Loss of Separation (LOS) events in Australia and has made a number of recommendations to enhance ATM in Australia. The following features are now being implemented in the current ATC system:

- Improvements to safety net conflict alerts, including of 5minute look-ahead time conflict alert.
- Selected Altitude Mismatch – use of Mode S DAPS & ADS-B “Selected Altitude” to provide an alert when this is mismatched with Cleared Flight Level (CFL)

7. OneSky and Future use of DAPS

7.1 The future joint civilian/military Australia wide ATM system, called OneSky, will make use of Mode S DAPS for safety net alerting and for display to the controller. This is expected to be fully operational by 2020.

7.2 The project supplier has been announced and work continues towards definition & design . Further details on the usage of Mode S DAPS will be provided as this program progresses.

8. Conclusion

8.1 The meeting is invited to note the information presented in this paper providing an update of ATC surveillance activities in Australia.

9. Action by the meeting

The meeting is invited to

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.
