



International Civil Aviation Organization

**THE NINTH MEETING OF THE SOUTHEAST ASIA AND BAY OF BENGAL
SUB-REGIONAL ADS-B IMPLEMENTATION WORKING GROUP
(SEA/BOB ADS-B WG/9)**

Beijing, China, 30 October - 1 November 2013

Agenda Item 3: Updating implementation and co-ordination activities

SURVEILLANCE PROGRAM UPDATE : AUSTRALIA

(Presented by Airservices Australia)

SUMMARY

This paper provides an update on the Australian Surveillance program.

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

En-route Radar Replacement (ERRP)

- This project is deploying new Mode S radars to replace existing en-route Mode A/C radars (SSR only);
- Three radars are now operational with the addition of The Round Mountain that was commissioned in August; and
- Two further sites are now under installation; Brisbane and Mt Bobbara

2.2 In addition to this project, the transportable Mode S radar (primary and secondary) no longer required by previous projects is currently being deployed to another site in Sydney (Cecil Park). This will provide additional redundant primary and secondary coverage in Sydney and to reduce shielding from city buildings.

2.3 The Mode S radar related projects are planning to deploy a total of 14 radar installations (new and transportable) over the next few years in addition to those already deployed since 2008.

WAM

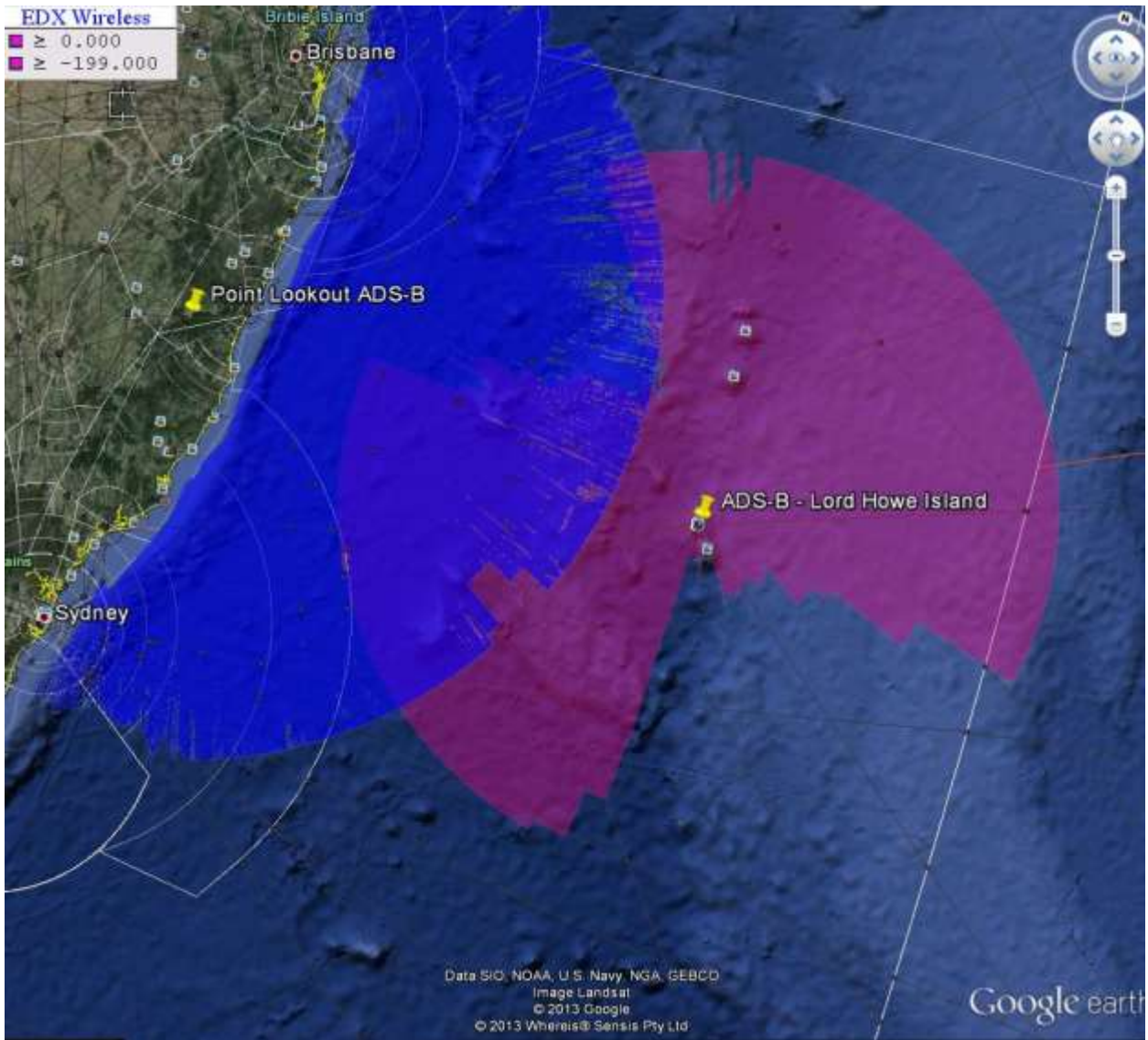
- WAM in Tasmanian (TASWAM) has been operational since early 2010;
- WAM in Sydney (SYDWAM) is operational in the terminal area supporting a 3NM separation standard and for Parallel Runway Monitor (PRM) application;
- Currently no plans to deploy further WAM systems; and
- Both WAM systems will receive a software upgrade in October that will include support for DO-260B ADS-B target processing

ASMGCS

- Operational in Melbourne since December 2009 and Sydney since May 2010;
- Brisbane system is now operational; and
- Perth system still being installed and tested with commissioning planned for mid next year

ADS-B

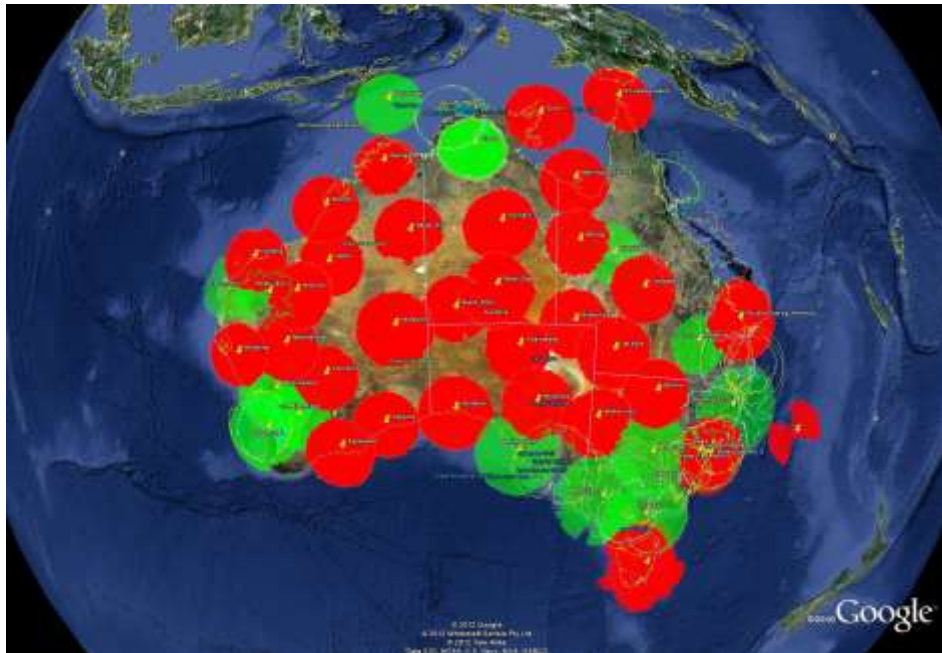
- 31 sites currently operational plus ADS-B from operational WAM systems; and
- Two additional ADS-B sites have been commissioned now. Point Lookout and Mt Hardgrave are now operational, primarily to fill in coverage around Lord Howe Island and increase overlap with Sydney radar coverage. This is shown in the diagram below.



- A new ADS-B ground station for Melbourne will also be installed later this year to provide additional backup surveillance coverage during enroute radar upgrades around the Melbourne Terminal Area and in time for the upcoming ADS-B mandate.

ADS-B Coverage and Communications Enhancement Project (ACME)

- This new project is planning to install 15 new ADS-B ground stations from 2014 to 2016. The new sites are shown in green below:



3. TRANSPONDER REGULATIONS AND MANDATES

3.1 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)

12 Dec 2013	ADS-B	All aircraft operating at FL290 and above must be fitted with ADS-B OUT <i>CASA currently consulting on exemptions</i>	Regulation (CAO 20.18)
6 Feb 2014	Mode S	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) Applies to – <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 	Regulation (CAO 20.18)
	ADS-B	Forward Fit - IFR aircraft must be fitted with ADS-B OUT Applies to – <ul style="list-style-type: none"> • new aircraft on register from 6 Feb 2014 	
4 Feb 2016	Mode S	All aircraft operating at Melbourne, Sydney, Perth & Brisbane aerodromes must be fitted with Mode S transponder with ADS-B capability (to support ASMGCS)	Regulation (CAO 20.18)
	ADS-B	All IFR aircraft operating within 500 Nm East/North of Perth must be fitted with ADS-B OUT	Regulation (CAO 20.18)
2 Feb 2017	ADS-B	All IFR aircraft must be fitted with ADS-B OUT	Regulation (CAO 20.18)

3.2 The next significant date will be the introduction of a mandate for the carriage and use of ADS-B for aircraft operating at FL290 and above. This applies in Australian airspace (domestic and foreign aircraft) from **12th December 2013**. A number of applications for exemption to this requirement have been submitted to CASA.

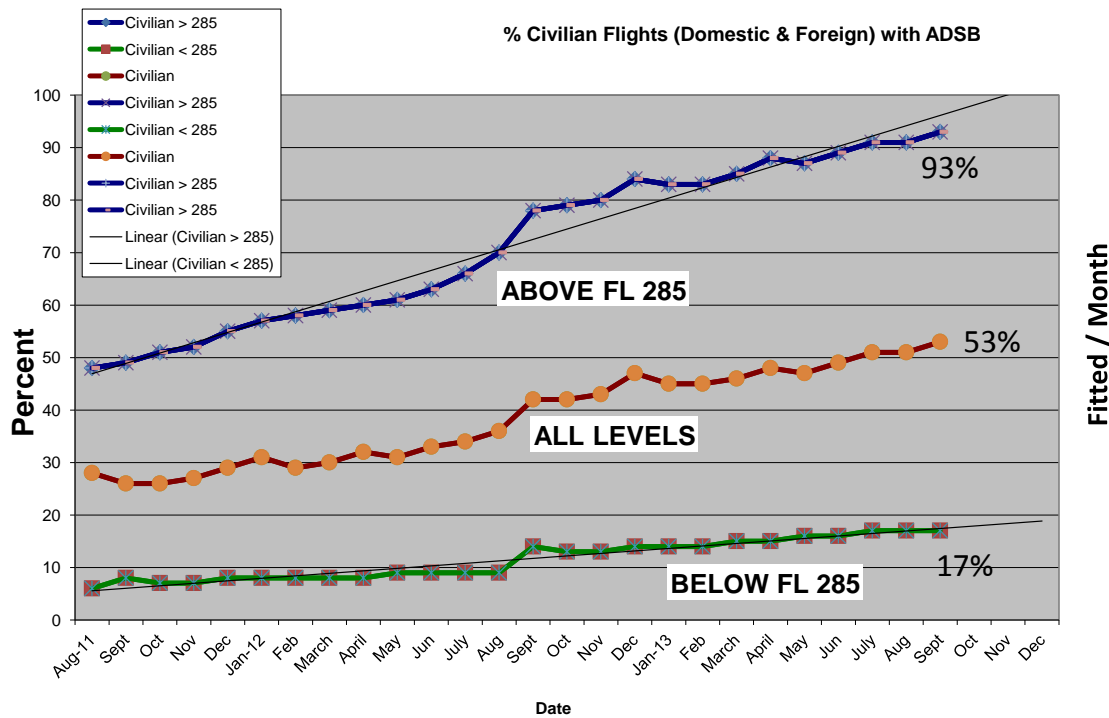
3.3 While considering these applications, CASA has released a draft instrument for consultation which would allow exemptions from the requirement to carry serviceable ADS-B transmitting equipment when operating in defined airspace. The airspace where flights could be exempted from the requirement is shown on the map below and consists of the “J curve” radar coverage on the East Coast around to Adelaide (shaded blue) and oceanic airspace where no surveillance currently exists (shaded green). The exemption would apply for 2 years. Exemption requests for other areas will not be approved.



3.4 Comments on the proposed instrument were received up to the 20th September.

4. ADS-B EQUIPAGE RATES

4.1 The following shows the steady increase in ADS-B equipped flights in Australia as we approach the Dec 2013 mandate. There is a high-level of equipage for international airlines though a small number will still require major retrofit. Domestic airlines that have not yet equipped have plans in place to meet the mandate deadline and no major issues are foreseen. Business jets are currently showing the lowest equipage rates (around 10%).



5. ADS-B REPEATER

5.1 Airservices has some locations where the ADS-B ground station coverage is suboptimal due to terrain constraints in remote areas without telecommunications infrastructure. A unique solution has been found whereby Airservices will deploy a very small avionics unit powered by solar cell and battery, in a location where it has line of sight to the coverage problem, as well as line of sight to the existing full capability ADS-B ground station. This avionics box will receive ADS-B signals from aircraft and then re-broadcast low power DF17 and DF18 messages to the existing ADS-B ground station site on 1090 Mhz.

5.2 It is only intended that this solution be used in very low traffic density environments to solve particular problems. These include

- ➔ on a remote island where a large mountain blocks coverage and the top of the mountain is not a possible ADS-B receiver site due to World Heritage environmental concerns
- ➔ potentially on offshore gas platforms where the platform superstructure causes obstructions.

5.3 A contract has been signed and testing is expected to take place in late 2013 early 2014.

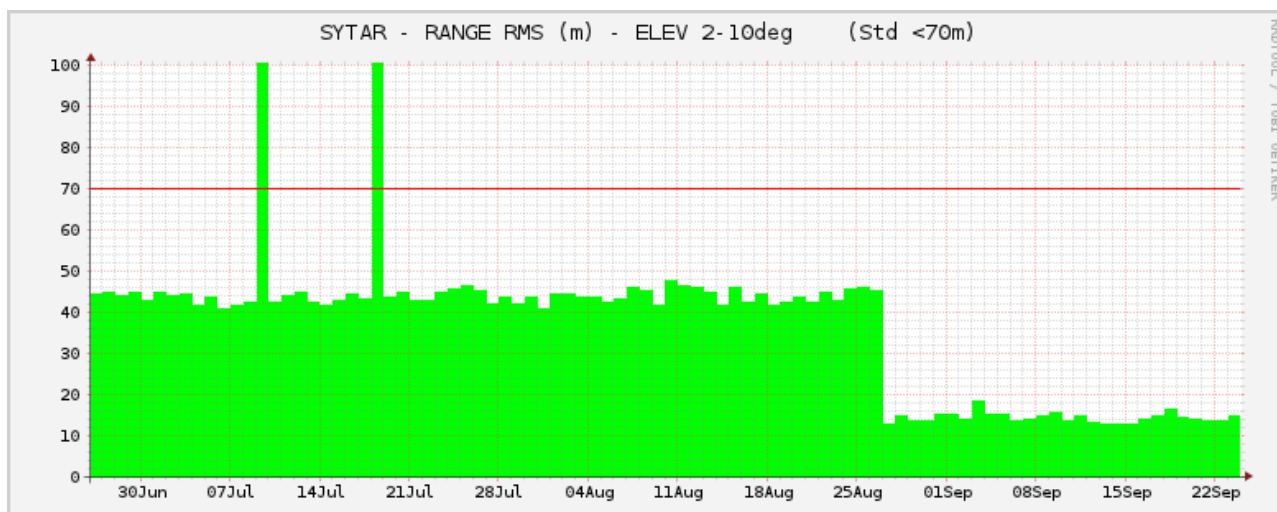
6. SURVEILLANCE MONITORING

6.1 A project is currently being scoped to provide automated monitoring of surveillance data within Australia. This will also enhance the surveillance sensor data recording function that was implemented a few years ago.

6.2 It is envisaged that this new system will include the following functions:

- Radar Performance Monitoring using ADS-B targets
- Radar Load Monitoring
- Aircraft Capability Reports
- TCAS RA Monitoring

6.3 As part of the above activity a demonstration system has been built to provide daily assessments of radar performance and present these using plots like the one below.



6.4 This sample plot shows the RMS Range Error for Sydney Terminal Area Radar (SYTAR). A number of other parameters for range and azimuth accuracy have also been calculated.

6.5 Aircraft targets with known good ADS-B avionics are extracted from the radar data and then radar and ADS-B positions are compared to estimate the performance of the radar. This provides a good ongoing measure of radar performance where sufficient overlapping ADS-B and radar coverage is available and takes advantage of the large numbers of ADS-B capable aircraft operating in Australian airspace.

6.6 The step down in results around the 27th August shows where an enhancement was added to the processing to account for the latency in ADS-B position reporting. The earlier results in July that went off the chart were due to a small sample of data for those days. The demonstration system will continue to be developed as a test bed while the proposal for the main system is finalised.

6.7 This capability will support current and future radar maintenance and support regimes.

6.8 The demonstration system also provides weekly summaries for aircraft detected either via Mode S (radar or WAM) or with ADS-B. Each summary includes statistics such as:

- Flight IDs reported
- ADS-B FOM/PA
- ADS-B Version
- Supported and down-linked transponder registers
- TCAS capability/version

6.9 This will form the basis of further study into areas like Flight ID Monitoring and TCAS RA and Version Monitoring.

6.10 Results will be presented to future meetings as they become available.

7. NEW ATM PLATFORM

7.1 Airservices Australia and the Department of Defence have released a Request for Tender (RFT) to deliver a new joint civilian/military Australia wide ATM system. The program, which has been called “OneSKY”, will deliver the new system for full operational use around 2020.

7.2 Further details will be provided as this program progresses. More information is available on the Airservices Australia website.



8. CONCLUSION

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