ADS-B GOES UP HIGH OVER DOWN UNDER

BY DAVE HIGDON

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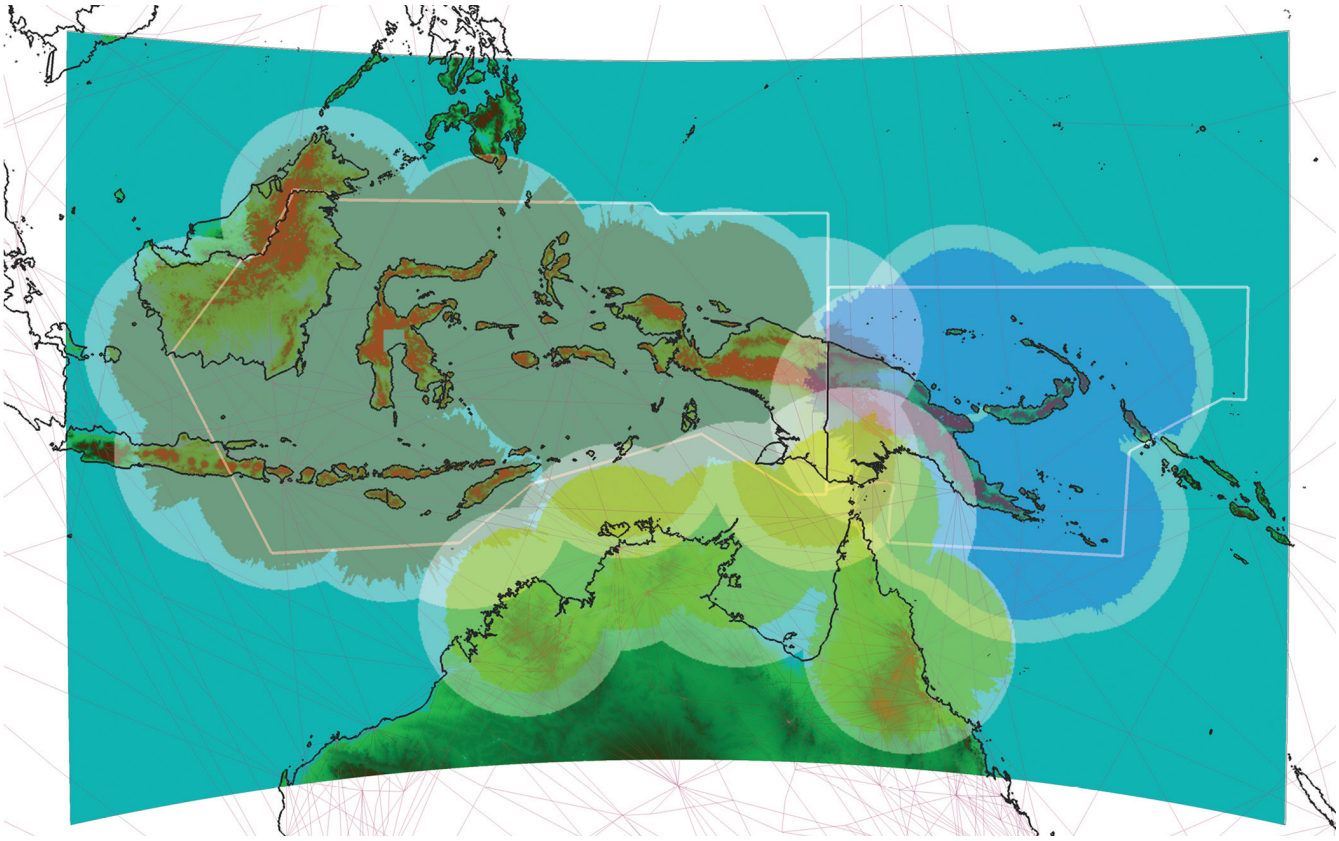


One of Australia's objectives in its region is to share ADS-B data between states to improve FIR (Flight Information Region) boundary safety. This approach is well accepted by the Asia pacific ICAO states. Note: This particular graphic does not include most Australian ADS-B ground stations and the plans in Indonesia and PNG are quite fluid.

By now you've likely heard the debate concerning the possible benefits of, and some or all of the objections to, the Federal Aviation Administration's proposal to adapt automatic dependent surveillance-broadcast as the backbone for the Next Generation Air Traffic Control network — ADS-B for NextGen.

The FAA wants everyone to convert, in essence, with the first bar to clear in 2012 and the final bar in 2020. The FAA sees potential for improvements in airspace utilization, better, faster coverage, and a chance to dramatically cut costs associated with eliminating a large number of navaids and radar sites and their support networks.

Benefits to users are, in some views, thin — a lot of cost without knowing whether pilots will see many benefits without buying higher-priced gear to gain access to potential services available in-cockpit.

To summarize the tone of the responses to the NPRM, well, it wasn't all that pretty. The consensus urged the FAA to reconsider its proposal and try again.

What the community seems to want is a proposal with something in it for stakeholders rather than a rule serving the agency's needs with little direct benefit for users.

While the United States still lacks a roadmap for making the changeover, a contract to supply the equipment needed to support the changeover already is in place. In fact, ADS-B is up and operating in some parts of the country with more ground-station installations ongoing.

Believe it or not, one country has not only committed to implementing ADS-B, it's already approaching the midpoint of an ongoing changeover and using the technology — but only on a voluntary basis.

That country is Australia.

In some ways this small revolution now under way Down Under leads world efforts to make changes in the architecture underpinning the air traffic control system.

Acting on decisions made about five years ago, the island continent's air-traffic management body, Airservices Australia, is nearing the midpoint of a program to install Thales ADS-B ground stations at 28 sites across the country.

The goal: provide continuous coverage to traffic operating at and above FL300 by using ADS-B to cost-effectively bring air traffic surveillance to regions never before monitored by secondary surveillance radar systems in use.

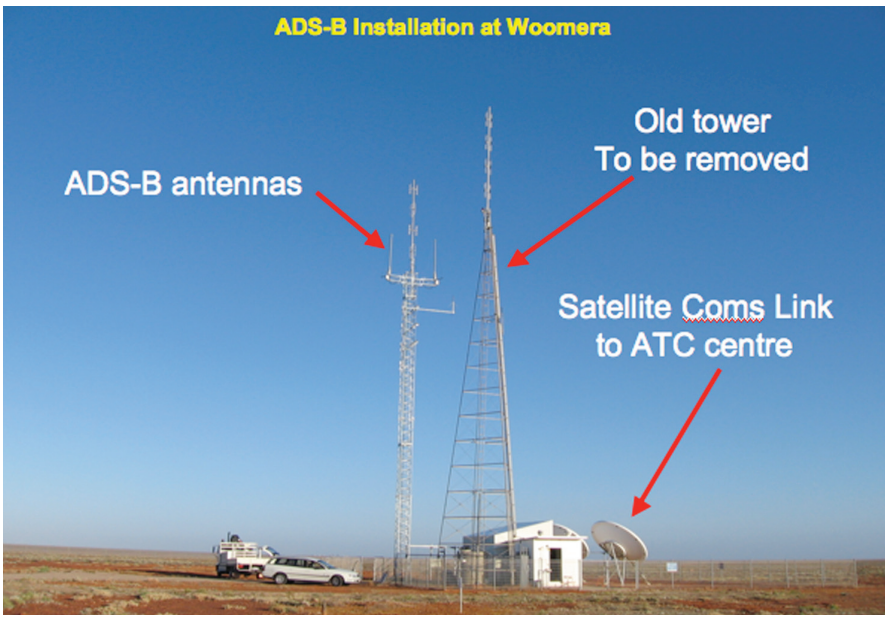
About a dozen sites are online and the others should be functional by year's end — with the changeover for up-high largely done Down Under by the end of next year.

Now under discussion — by some reports, more controversial — is requiring carriage of and use in both lower and upper airspace, including airspace where most general aviation flies.

Notwithstanding the debate focused on transitioning to mandatory requirements, by dint of its decision to proceed with the voluntary transition, Australia lays claim to being the first nation to move toward fully deploying an ADS-B-based air-traffic management system.

Looking at some of the information made public in support of the investment and changeover, it seems Australia opted to spend money on better service and, at the same time, save money — savings that seem to stack up in several ways.

In some ways, Australia's own proposal to affect the changeover for most airspace could be a model for a more-acceptable proposal in the U.S.



The Dollars & Sense of Australia's Solution

Four years ago, Airservices Australia began work on the transition to ADS-B after working with the industry to examine the challenges, costs and benefits of the switch.

The Australian players first used a trial in the airspace above the state of Queensland to affirm the technological potential of ADS-B for regional ATC services. This led to implementation of the Upper Airspace Program (UAP).

With the benefits of lessons learned during the tests and from the early stages of UAP, the government's ATC agency moved ahead with its plan, buoyed by promises of fiscal and operational gains, factors that jointly drove the decision, according to the participants.

On the operational side, you can list benefits echoing those promised for ADS-B in the U.S.

Among those benefits are increased tracking accuracy, faster, more frequent position updates, the ability to put traffic closer together and increase airspace capacity, and, on aircraft properly equipped, the ability for everyone with ADS-B to see everybody else with ADS-B in the airspace.

On the fiscal side, the supporting factors appear even more compelling: $200,000 a pop for the ADS-B ground stations for a total of less than $11.5 million, according to information from Airservices Australia.

Compare this network cost to the price range for just a single new secondary surveillance radar site: $8 million to $12 million, plus another $1 million per year for upkeep.

Drop just a couple of SSR sites off your wish list and you would cover

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the entire infrastructure costs of converting wholesale from costly, constrained, maintenance-intensive, not-too-fast radar to faster, more reliable, more accurate, more promising new technology.

Or, to slice the pie another way, invest the cost of one year's upkeep for 11 sites — or remove the maintenance costs of one SSR site for 11 years — and you've largely covered ADS-B hardware installation costs.

Between the comparative technological and financial benefits, it's hard to fault the decision.

Of course, there is a cost to the user — almost exclusively one-time equipment costs — for those who wish to transit Australia-controlled airspace.

First, the aircraft needs an IFR GPS or GNSS navigator. Most modern airliners and business jets already boast high-capability satellite-navigation receivers in their panels.

Second, the aircraft needs a box to provide the connection between the aircraft and the ground stations.

Finally, the aircraft needs a multifunction display — but only to realize benefits associated with an onboard traffic display. And, again, high-capability MFD gear is SOP in late-model airliners, upgraded airliners and most business-turbine aircraft delivered in the past decade.

The ADS-B system currently going online employs, the 1090 extended squitter transponder and any mandatory requirements in Australia will be for 1090 ES only.

In 2004, the Asia-Pacific region's upper-level overflight traffic exceeded 565,000 operations, with the highest concentration around Singapore.

Lest anyone believe this changeover is strictly a coastal project, they should know five sites commissioned last August brought air-traffic surveillance for the first time to the locations involved: Karratha, Billabong, Alice Springs, Broome and Tennant Creek.

Benefits for All, and All to Benefit

Early participants approved for ADS-B operation under the Upper Airspace Program include Australia's national flagship carrier, Qantas, and Virgin Blue. These early adopters get the advantages of the spacing and accurate tracking ADS-B provides.

But Australia's changeover also offers some benefit to those other than the early adopters.

According to Airservices Australia, the move to ADS-B offers benefits to both those approved to use the technology as well as those not yet onboard.

For example, the higher degree of accuracy available from an aircraft's ADS-B data stream means controllers can offer non-equipped aircraft more accurate position data on possible conflicts.

The ADS-B system also brings into play airspace previously not served by any surveillance technology, radar or otherwise — which means ATC can more efficiently use those newly covered regions and safely space ADS-B-equipped aircraft on tracks distinct from those of non-equipped aircraft, taking pressure off the routes for non-equipped aircraft.

As ADS-B equipage expands in the commercial fleet worldwide, more aircraft will be qualified to transit the Australian airspace, receiving the gains from the technology.

And the move to mandatory ADS-B requirements promises more than the aforementioned operation benefits for the lower airspace users.

Transition Proposal for GA Under Review

As the UAP effort rolled on toward completion, the focus last year moved toward mandatory use of ADS-B over the continent, including significant sections of lower airspace.

In their August 2007 proposal to move civil aviation to GNSS and ADS-B for all enroute navigation and surveillance, four Australian government agencies came together to work for the change.

Working together, Airservices Australia, CASA, the Australian Defense Department, and the Department of Infrastructure, Transport, Regional Development and Local Government put forward a roadmap that would complete the changeover by the 2012-2014 timeframe. Comments were due by Oct. 31, 2007, and the partners now are digesting the responses.

Sounds familiar, doesn't it? A similar scenario occurred in the U.S. last fall.

A prior plan to start the transition was put on hold in 2006 to resolve early concerns about the level of requirement, the costs, availability of

equipment and how the system might alter flying for pilots of light aircraft who traditionally operate in the lower altitudes — particularly out in large swaths of the country where ATC contact largely has been phone-based.

Proponents want the new proposal to answer the prior questions and concerns, and they stress bringing the technology to the entire nation would offer some obvious new benefits for participants and the nation's Air Traffic Management capabilities.

Even without an expansion of the ADS-B network beyond that implemented for UAP, the system envisioned would allow for accurate tracking and coordination in large swaths of Australia never before covered.

Proponents contend that equipage for ADS-B by the majority of the country's private and sport aircraft would improve their access to airspace because of the separation capabilities it would bring to aircraft not currently equipped for access to some airspace.

Because much of the country's airspace is as sparsely used by flyers as it is populated below, separation is seldom an issue in these areas. Similarly, pilots are largely on their own in terms of ATC knowing where they are because communications between pilots and controllers can be sparse.

Although there are no plans for the entire country to be covered, a total of 39 ADS-B ground stations will be commissioned regardless of any decision to proceed with ATLAS. Australia also will have the opportunity to quickly and economically add additional surveillance should traffic levels so demand.

For services such as Australia's airborne physicians and others flying routinely over the Outback, the ability to participate in the system via ADS-B promises a margin of safety unavailable because of the lack of radar. And adding SSR systems is something Airservices Australia is trying to avoid while also seeking to cost-effectively provide ATC services.

Like pilots in the U.S., however, Australian aviators want answers to questions about costs, equipment requirements and the utility.

In the U.S., universal access transceivers (UAT) are proposed as the onboard ADS-B link for light aircraft flying in the lower airspace, while 1090 extended squitter is to be used in the upper strata. The ground network will be equipped with electronics capable of translating data from either source.

In Australia, however, the equipment going up at the 28 designated sites employ only 1090 ES and not UAT capability.

Currently, no low-cost, light-plane-compatible 1090 ES equipment is available.

Furthermore, the UAT offers the datalink capabilities lacking in 1090 ES, capabilities underpinning ADS-B services, such as data-link weather and text capabilities.

Whether to equip for these extra services is being left to aircraft owners — and even then, their choices of UAT are limited and the costs a concern.

Sweetening the Appeal: Let Savings Cover Cockpit Transition

The Australian proposal faced a pilot community concerned about costs to participate in the new-technology ATC network and the actual benefits they can expect, as well as the expense of the higher level of equipment needed to realize those extra benefits — an area where the political and regulatory considerations in Australia closely parallel some of those issues in the U.S.

Therefore, Australia sweetened the deal regarding the onboard equipment, and this is where Australia and the U.S. differ significantly.

The proposal in Australia calls for subsidies to light aircraft owners, covering the costs of equipping to the base level it will require for access to the system. In turn, the participants hope support for the basic gear will make more palatable the costs to owners of equipping to the higher level where more in-cockpit benefits can be realized.

The FAA offered no such incentive in its proposal for starting the transition to an ADS-B/GPS-based ATC network.

Australia's subsidy plan would underwrite the costs of the base equipment needed for participation — basically, an ADS-B Out transmitter and a GNSS navigator to supply needed data — for aircraft with a maximum takeoff weight up to 12,500 pounds (or 5,700 kilos down there).

According to Airservices Australia information, "If ADS-B-based surveillance and GNSS only-means navigation can be deployed instead, the Australian industry may be able to fund basic ADS-B/GNSS equipment for all affected aircraft with MTOW less than 5,700 kg and still make considerable savings."

In other words, savings to the provider can be realized even after covering the costs of helping equip the nation's light aircraft.

The Air Traffic Management service also noted this about the alternative: "Maintaining the existing enroute surveillance and navigation networks (secondary surveillance radars, NDBs, VORs, etc) will be very expensive for Australia's aviation industry."

In fact, by 2012, Airservices Australia will face the prospect of replacing some very expensive systems — hence, some of the urgency.

So, there's that cost/benefit issue again.

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Rather than proposing aircraft owners foot the bill to equip their aircraft with the ADS-B/GNSS minimum gear while it realizes all the cost benefits, the Australian industry can realize savings enough to underwrite those equipment costs. This would leave to the aircraft owners only the cost difference for an ADS-B transceiver — instead of the basic transmitter — and a multi-function display to gain access to the added services available.

This so-called ADS-B In capability brings into the cockpit display weather images, text weather data and traffic images — all the information possible with ADS-B.

The Australian goal of going completely GNSS and ADS-B for the nation's entire air-traffic management realizes much of its tremendous cost-reduction potential by eliminating many of the costly, maintenance-intensive systems on which the old system depends: SSRs, VORs and NDBs — and, at the same time, redesigning its traffic flow without reference to the legacy system, except as a back-up where required.

This approach also promises further long-term savings for aircraft operators who no longer need VORs and NDBs in their aircraft's panels. The owners get both maintenance and weight savings.

The long-term costs of operating and maintaining the in-aircraft hardware for ADS-B, according to Airservices Australia, would be nominal: about $150 (AUS) for two years — comparable or a bit less than the biennial costs of an IFR transponder and static-system check.

While there's no free lunch for anyone here, considering the potential and long-term savings, shifting to ADS-B appears, at least in Australia, to be a low-cost cafeteria in which the customer picks as little or as much as desired.

For those unimpressed with the potential benefits of ADS-B In versus their costs to play, the proposal would seem to make this as close to free as it gets — in lunches or in aviation. ❑

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