FAA: Coming NPRM Mandates ADS-B by 2020

— But First, There's Much To Do...

BY DAVE HIGDON

The Federal Aviation Administration has looked into the future, and it is an ADS-B world. This emerging technology has become the officially anointed technology the agency plans to deploy as the backbone of the Next Generation Air Traffic System, or NGATS.

Unless you've been flying only in the remotest areas outside North America, by now you likely know something about the acronym ADS-B. You also probably know ADS-B comes from the mouthful of a title for this emerging technology: automatic dependent surveillance-broadcast.

However, you might not realize the FAA approved a second-phase plan last fall to implement ADS-B nationwide over the next five years, beginning the transition to the so-called NGATS.

Pilots will want it — and they'll have to have it to use Class B airspace by 2020, according to statements by agency executives describing the intended outcome of a notice of proposed rulemaking (NPRM) planned for release this September.

As ADS-B stands up, the FAA plans to stand down as much as 50 percent of its ground-based radar system of tracking aircraft and managing their flow. A large percentage of the ground-based system used for en-route navigation and precision-approach guidance also is slated for decommissioning. A separate area-navigation system likely will back up GPS as the primary navigation source.

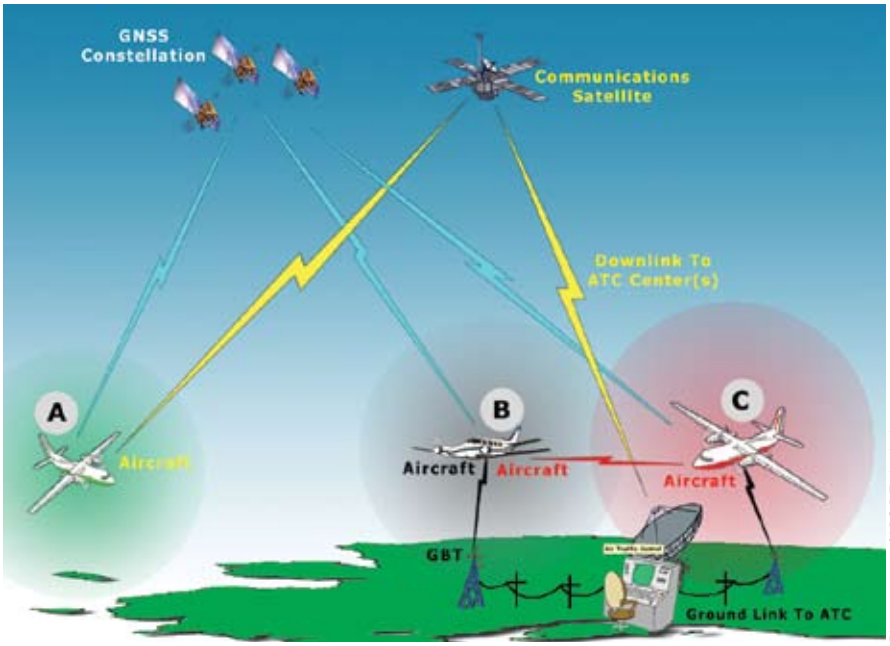

Photo courtesy of ADS-B Technologies.

If the FAA's ideal comes to pass, the air traffic control (ATC) system will be less expensive to operate and maintain, more reliable, more accurate and more flexible. And aviators of all stripes need the agency to meet those goals to handle expected increases in traffic.

But before the FAA starts the switch to an ADS-B-based air-traffic system, there's a ton of work ahead: picking a contractor to supply, install and operate a network of 500 ground stations, the links between stations and controllers' air-traffic displays.

And, along the way, expect many potential business opportunities for manufacturers, after-market suppliers and avionics shops to meet the demands of aircraft operators for the on-board ADS-B hardware needed to participate in an ADS-B-based ATC system.

Much remains undecided in regards to how the switch will occur, the shape of the transition and when the changeover will be complete — years downstream for that last point.

However, by 2020, expect the FAA's air-traffic infrastructure to look significantly different, with far fewer secondary surveillance radar sites, ILS systems and VORs — and, in all probability, no NDB stations still broadcasting.

How the NGATS will be structured and operated might not yet be known, but GPS, the wide area augmentation system (WAAS) and ADS-B combined will be the dominant technologies used to monitor and direct traffic as well as provide traffic and weather

information to cockpits.

Pilots will need it — even if they don't already understand why they should want ADS-B hardware working in their cockpits.

Much more should become clear in September when the FAA publishes its planned NPRM defining the cockpit equipment requirements and mapping the national transition toward ADS-B.

ADS-B: A Quick Primer

Let's take a quick look at ADS-B, how it came about, why it's hot, and what it offers pilots and controllers, based on information from the FAA, agency insiders and industry.

The FAA reached its conclusion to embrace ADS-B after working with general aviation pilots and an express-package carrier on a pair of operational tests the FAA set up nearly a decade ago, one in the Ohio River Valley, the other in Alaska.

Alaska provided the perfect proving grounds for ADS-B — little radar or radio coverage over the majority of a wilderness-dominated state with a disproportionate level of general-aviation activity connecting remote communities with the state's population centers, like Anchorage and Juneau.

Under the auspices of the Capstone Project, the FAA equipped hundreds of local aircraft to use ADS-B — which, over time, proved the perfect solution to Alaska's challenging flight environment by providing pilots and controllers a new level of situational awareness in areas previously lacking any coverage.

ADS-B basically works by taking position data from an on-board GPS receiver combined with aircraft speed, direction and altitude data, then broadcasting that information via an on-board universal access transceiver (UAT) for receipt by every ADS-B receiver — ground and airborne — within about 150 miles.

So, every ADS-B-equipped aircraft in range sees every other ADS-B aircraft in range on an on-board multi-function display — just as those aircraft get to see the position of every other ADS-B-equipped aircraft.

Additionally, the ADS-B ground stations scattered strategically around the state receive and relay the aircraft data from every aircraft within range, and route that information to air traffic controllers to display on their radar screens, along with any radar data received. The aircraft data is updated rapidly, hundreds of times a minute, so both pilots and controllers can see the targets in virtual real-time.

The combination of capabilities from GPS, WAAS and ADS-B working as a system means pilots get traffic information far further out than with any on-board or ground-based traffic-alert system, as well as precise information on the other aircraft's speed, altitude and direction of flight — even showing whether an aircraft is climbing or descending, all in real-time.

Finally, the same data link used to broadcast individual aircraft data between aircraft and ground stations also can broadcast to ADS-B aircraft a wealth of weather data, text and graphical information to further aid pilots in the safety of their flights.

The ground stations must be spaced to provide coverage across the desired real estate. But with no line-of-sight problems like radar, the properly placed relay stations suffer no issues related to aircraft location or altitude. Also, unlike radar, which depends on the sweep of the antenna to update position data, ADS-B suffers no time lag, whether in the en-route environment or in the terminal area. And with no altitude limitations, ADS-B can be adapted to provide airport traffic information of both aircraft and ground vehicles.

If the FAA's projections and spending plans hold, shifting to ADS-B should precipitate a significant drop in the cost of maintaining the ATC system, thanks in part to the elimination of all those ground radar systems, ground-based navigation hardware, and a simplification of the massive computers the FAA now needs to crunch all the data coming from various radar systems.

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And those savings are aside from the added safety of a system that so dramatically improves pilots' situational awareness.

Already a Work In-Progress

Sixteen ground communications stations soon will be going in along the Gulf of Mexico, on key oil platforms and on shore, along with 26 automated weather-sensing stations, to provide complete ADS-B coverage of the Gulf's off-shore helicopter traffic.

At the 2007 Helicopter Association International convention earlier this year, the FAA promised priority service — "like an HOV lane" — to off-shore operators who upgrade their helicopters with the equipment needed to use ADS-B.

On the Eastern Seaboard, efforts already are under way to provide an overlapping network of ADS-B ground stations to provide coverage from the New Jersey/New York City area all the way to the tip of Florida, providing coverage over practically all of the states touched. Stations also are slated for Arizona and the West Coast — before backfilling across the middle of

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the continent to complete coverage.

By 2013 or so, the FAA hopes to have the entire country covered and be well along on its transition toward 2020 when, by the rulemaking expected in September, ADS-B will be mandatory for access to high-traffic airspace and the IFR system above FL180.

And lest anyone still believe ADS-B is a technology far ahead of the market, already the UAT boxes are available for installation. For example, Garmin International's GDL90 UAT goes for just under $8,000, plus installation, providing the necessary connection to the ADS-B system now under development.

Additional equipment needed includes a display on which to show the data received by the UAT, and a WAAS-enabled GPS to provide position data — two pieces of gear increasingly common in today's new aircraft and as retrofit to older birds.

More ADS-B Goings On

In late February, the FAA Joint Resources Council approved the funding package to proceed with developing ADS-B, with a goal of starting the changeover in 2009. Shortly after that approval, the agency approved three companies to bid on the ADS-B package that will equip the nation for the coming changeover.

ITT, Lockheed Martin and Raytheon Corp. all plan to compete for the contract to design, manufacture and install an ADS-B network of stations numbering around 500. The winner also will operate the network and provide the data to the FAA for its use in ATC as a fee-based service.

The contract will cover years of business for the winner. Needless to say, this is one of the most coveted contracts pending at the FAA.

In June 2006, the FAA's JRC approved Segment 1 of the ADS-B transition plan, including funding for 2007 and 2008. Under the plan outlined in Segment 1, the agency plans to: install ADS-B at Philadelphia, Louisville, and Juneau; install those new stations on oil and gas platforms in the Gulf of Mexico; and expand ADS-B along the East Coast, throughout North Dakota, and along the lower part of the United States to Arizona and through southern California.

The initial segment also covers development of ADS-B separation standards and software to bridge the connections between ADS-B and other ATC systems. The FAA's planned transition period to complete nationwide coverage runs from 2009 to 2014, when ADS-B should be fully implemented and in service.

But already there's a dispute about the nature of the new network. ITT and Lockheed Martin both predicated their planned proposals around a dual-frequency system, one for general aviation supported by the UATs already developed and approved, and a 1090 system for the airlines and high-flying turbine aircraft.

Raytheon, however, wants the latitude to bid on developing a single-frequency system using only the airline-oriented 1090 system and "transitioning" general aviation away from the UATs already employed by the Capstone participants and other early adopters.

ITT and Lockheed Martin both filed protests that the Raytheon proposal does not meet the FAA's own guidelines for the system and services. The protest remains in play, so stay tuned.

Keep Watch — This Should Move Quickly

The timeline of 2009 to 2014 might sound like it's a ways off, but it's an ambitious schedule the FAA believes is possible largely because of the Capstone and Ohio River Valley test programs run for the past seven years.

Many of the same general aviation users who already have WAAS/GPS and multi-function displays are likely to become early adopters of the ADS-B hardware needed to use this new system.

Others will come on board when they find their airspace access limited by their lack of ADS-B equipment as the FAA transitions away from the old ground-based system. This also means several years of the FAA operating dual ATC backbones until the transition is complete.

But thanks to the embrace of the now-active WAAS and the long-established familiarity with GPS, ADS-B not only enjoys a degree of accuracy that far outstrips radar in precision, it also seems to enjoy a sense of continuity among pilots ready to see their GPS investments do more for them and ATC.

In the end, both the FAA and aircraft operators should enjoy their own distinct benefits from the change. For the FAA, the combination of high-precision position data, rapid refresh rates and increased accuracy in tracking aircraft should bring reduced IFR separation standards and safely accommodate more aircraft on more approaches.

For operators, the ability to use more direct routing and the resulting savings in time, fuel and money should be icing on the cake of better service and increased information on other traffic, weather and flight information delivered via the ADS-B link.

Saving money and improving safety are goals both pilots and aviators seem to share.

All of this means the next five to 10 years will be busy ones — for the FAA, for its ADS-B contractor, and for those companies savvy enough to get into position to sell, install and service the new ADS-B hardware and required equipment aviators will need. ❑