



AVIATION WEEK EXECUTIVE ROUNDTABLE:

Setting the Pace for NextGen ADS-B Adoption

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March 25, 2009

The nation's air traffic is projected to triple over the next several decades. To ensure future safety, capacity and environmental needs are met, the National Airspace System will be undergoing a transformation using 21st century technologies. Known as the Next-Generation Air Transportation System (NextGen), it is enabled by a proven technology called Automatic Dependent Surveillance-Broadcast (ADS-B).

Although there is consensus among the many stakeholders in the nation's airspace that the current system needs to be upgraded, there is yet to be agreement on the application of ADS-B technology, and corresponding operational and funding issues.

Since 2004, AVIATION WEEK has led Executive Roundtables that bring together multiple stakeholders in a neutral environment to address issues critical to the aerospace and defense community, with the goal of identifying actions to be taken by individuals or organizations that will benefit the enterprise as a whole.

The future aviation infrastructure, based on ADS-B, was the focus of a March 25 AVIATION WEEK Executive Roundtable held at the Hilton Alexandria Mark Center, just outside Washington, D.C. The goal of the roundtable was to determine what the industry can do to move ADS-B ahead faster over the next 12-18 months. The event preceded AVIATION WEEK'S Management Forum on ADS-B and NextGen Air Traffic Modernization on March 26-27.

The roundtable was hosted by Hank Krakowski, Chief Operating Officer, Air Traffic Org., Federal Aviation Admin. (FAA); James May, President and Chief Executive Officer, Air Transport Association of America (ATA); and Graham Warwick, Sr. Technology Editor, AVIATION WEEK. It was held in association with ACSS, an L-3 Communications and Thales Company.

Organizations participating in the roundtable were Aerospace Industries Association; Air Carrier Association of America; Air Line Pilots Association International; ATA; Aircraft Owners and Pilots Association; American Association of Airport Executives; Boeing; Continental Airlines; Delta Air Lines; Embry-Riddle Aeronautical University; FAA; Flight Safety Foundation; FreeFlight Systems; General Aviation Manufacturers Association; Helicopter Association International; ITT Corp.; LHD & Assoc., Inc.; Lockheed Martin Corp.; MITRE/CAASD; National Air Traffic Controllers Association; National Business Aviation Association; National Transportation Safety Board; NAV CANADA; NY/NJ Port Authority; Regional Airline Association; Rockwell Collins; RTCA, Inc.; Sensis Air Traffic Systems; Thales North America; United Airlines; UPS; US Airways; U.S. Department of Defense; U.S. Senate Aviation Subcommittee and the U.S. Transportation, Housing & Urban Development Subcommittee.

Roundtable participants divided into six work groups that were challenged to respond to a set of questions that focused on either the application of technology, operations or funding for ADS-B. Following the discussion, participants prioritized industry actions.

KEY FINDINGS:

- The U.S. government should finance ADS-B avionics equipage (not including installation, training, etc.) across air transport, general aviation, government and DoD aircraft to accelerate effort and assure maximum return on investment.
- To support the first finding, the U.S. government should apply a Manhattan Project approach on ADS-B, and appoint a “Czar” with ultimate accountability.
- The biggest challenge lies in equipping aircraft with ADS-B avionics, not in deploying the ground-based infrastructure. With a seven year gap between infrastructure in 2013 and mandatory equipage in 2020, near term benefits, such as “best-equipped, best served” and reduced separation will be required to achieve levels of voluntary equipage that will deliver benefits sooner.
- There are various ways to make equipage more affordable, including subsidies, incentives, leasing, a national infrastructure bank, etc. It is important that this not be an unfunded mandate.
- Additional research and human factor studies are recommended to address controller/pilot acceptance.

The key findings are based on the details of topical conversations in the work groups, which addressed the following sets of questions:

1. Application of Technology

What are the major hurdles to delivering the ADS-B technology and suggested ways to move past them? What are the major risks associated with the delivery of the technology moving ADS-B forward and how can they be overcome? Based on the answers to the above, how can we as an industry move ADS-B ahead faster?

2. Operational Issues

How do we incorporate controllers and crews sooner in the process to validate needs and priorities for this new environment? What operational issues are currently under-addressed? Based on the answers to the above, how can we as an industry move ADS-B ahead faster?

3. Funding Issues

How do we resolve the issue of funding? What should be our priorities with respect to possible funding vehicles? Based on the answers to the above, how can we as an industry move ADS-B ahead faster?

EXECUTIVE SUMMARY – The ADS-B Roundtable on March 25 surfaced a lack of understanding of the status, benefits and issues of ADS-B among industry leaders outside the small community that has been working closely with the technology. This is already prompting calls for a greater outreach effort to educate a wider audience.

WORK GROUP FINDINGS:

APPLICATION OF TECHNOLOGY:

Hurdles:

- Building the business case for adoption by end users is complicated by lack of ADS-B In applications; lack of standards for ADS-B In applications; and the requirements churn for ADS-B Out (DO-260x)
- The policy “best-equipped, best served” is code for certain things and user groups
- Is it possible to get it to market and useable in a real time way?
- Are people available to develop the required operational procedures?
- All stakeholders need to be prepared to deal with public reaction as direct routing means planes will fly where they didn’t before...there may be “noise wars” as the public reacts

Risks:

- Safety must remain top priority
- There is risk associated with early adoption, since standards are in flux and there is no assurance early adopters will be grandfathered in. May have to retrofit later at added cost, once rules stabilize
- Infrastructure bandwidth limitations are real and will affect ability to achieve desired performance levels; risk includes interruption of funding before full implementation and FAA’s credibility and track record on large-scale technical projects

- The human factor to adoption is a risk with concern about the acceptance, readiness and performance of pilots and controllers

Recommendations to address hurdles and risks:

- Fast-track consensus standards for ADS-B In applications
- Develop streamlined certification and operational specification approval processes for standardized applications
- Address policies such as the best-equipped, best served approach early on with senior decision-makers and user groups
- Establish government funding outreach and early adopter incentives
- Tailor benefits to specific user groups
- Align implementation roadmaps, look for opportunities to streamline, and fund high-risk areas
- Create a system for grandfathering in early adopters to ensure they aren't locked out of the benefits stream later
- Ensure continued funding via democratic process (lobbying, marketing, etc.)
- Continue funding risk-mitigation investigations
- Ensure infrastructure elements are in place with high confidence; ensure procedure feasibility and familiarization through simulations and demonstration plus adequate training by both the FAA and users

Additional Actions to move ADS-B ahead faster:

- Develop better-defined business case for end-users (e.g. air transport wants payback in one year)
- Provide incentives to “prime the pump” with specific benefits for communities of interest
- Consolidate various groups, roles/responsibilities; drive applications to consensus road map
- Find a way to use existing avionics when possible, rather than developing all new, since costs come down as technology matures (as in example of \$9K transmitter now available for \$1.5K)
- Understand specific application limits to extent possible—no surprises

OPERATIONAL ISSUES:

Controllers and pilot acceptance:

- Involve pilots and controllers at earliest possible stages
- Establish more programs like Capstone in Alaska to validate what we say about ADS-B technology and generate buy-in from users
- Develop Human-in-the-Loop testing and find funding sources to enable pilots, controllers, manufacturers, regulators and operators to be reassigned from regular jobs to participate
- Review operational issues such as information management, and pursue reliable funding and resources

Under-addressed operational issues:

- Some separation standards were generated 20-30 years ago, and we lack insight into how they were developed
- Need to establish timeline to certify hardware, standards and separations to put aircraft closer together
- There will be mixed equipage flying through 2020 and beyond, with some aircraft equipped with ADS-B and some legacy aircraft flying without it. How do you deal with the workload changes and priority of service—best-equipped, best served?
- Need broader understanding of how operational concepts (CONOPS) drives policy to focus benefits
- Need to define what preferential treatment for deploying technology early means, what an operator will get and how much it will cost. Should it be exclusive? If only one airline invested, should everyone flying into an airport reap the benefits?

Additional Actions to move ADS-B ahead faster:

- Focus on “NowGen” as opposed to “NextGen” with flight plan, overarching task force
- Need to solidify standards
- Need to go back and re-quantify the benefits
- Need to further define and communicate incentives (such as faster search and rescue times)

- Streamline the certification process, and reduce time requirements to develop new standards
- Secure funding
- Show preferential treatment to those that proceed
- Test in a high-traffic, congested airspace, such as New York

FUNDING ISSUES:

Resolving the issue of funding:

We will need to change how we approach this issue. There exists a need for a common voice, mutual trust, assured funding and a positive cost/benefit analysis.

- Develop common aviation infrastructure vision that includes financial and economic return
- Consolidate and integrate funding for ground equipment, operational procedures and standards, and aircraft equipage to assure smooth, no-gap, implementation
- The two work groups approached the issue of funding differently:
 - Estimates of required full funding range from \$3.5 – 4B
 - Another view is that funding for full equipage would be approximately \$1 billion and that priority be given to fund the gap between the mandated regulatory cost and operators' value/investment return to reach critical mass (approx. 1/3?) which would be approximately \$150 million to be spread out over a few years. Proposed it might be possible to reallocate the money that is already there. ADS-B is a piece of NextGen, and funding would enable the entire system
 - Feedback noted that:
 - While the transformation may be centrally orchestrated, there are strategic roles to be played. ADS-B funding can't be put into the NextGen basket
 - Money is for the industry, but with a public benefit. A comparison can be made to taking risks out of the medical system by increasingly going to electronic notes

Priorities for possible funding vehicles:

- No one source can be expected to pay for the costs of ADS-B, we need a number of sources. The aviation industry needs to collectively get its act together to attract this money.

Sources of funding may include:

- A general fund contribution
- Second stimulus package in the future
- Private investment by operators (which will require a trusted partnership with the FAA)
- Subsidies for early adoptees
- Funding from a National Aviation Infrastructure Bank; Airport Improvement Project; Passenger Facility Charges; Senate Finance Plan; and the FAA's Facilities and Equipment Budget

Additional Actions to move ADS-B ahead faster:

- 100% of aircraft need to be equipped, and a fair amount of public funding will be needed
- Get industry agreement on real costs and real benefits
- Pursue funding from multiple sources named above (options range from gap through full funding)
- Fund gap that exists between mandated regulatory cost and operators' value/investment return (although ADS-B Out is always going to have a gap and closing it will be hard)
- Accelerate ADS-B In applications
- Develop information campaign to achieve broad public acceptance/understanding

BACKGROUND INFORMATION:

ADS-B uses satellite-based technology to automatically broadcast the position and intent of the aircraft to air traffic controllers and pilots. It provides far more accuracy and coverage than existing radar-based technology, allowing more direct routing with safe separations in the sky and on runways. ADS-B will eventually allow some of the responsibility for keeping safe distances between aircraft to shift from controllers on the ground to pilots.

ADS-B requires new operational procedures and standards, and investment in a nationwide infrastructure of ground stations. It also requires investment in equipping aircraft with upgraded avionics to transmit and receive the ADS-B messages and a display capable of

showing ADS-B information. Equipage costs may range from less than \$10,000 for small aircraft to more than \$100,000 for large aircraft.

ADS-B was first used in the late 1990s in the FAA's Capstone test program in Alaska. It is currently used by UPS at its hub airport in Louisville, Kentucky. A more advanced version of ADS-B is now being deployed in the Miami area, and is planned to be deployed by 2010 at key sites in the U.S. including the Gulf of Mexico; Louisville, Ky.; Juneau, Alaska; and Philadelphia, Pa. These partnerships enable the FAA to gather operational data, demonstrate effectiveness and begin delivering improvements into the national airspace.

The full evolution of ADS-B will take up to 20 years, with half of the current system of radars operating throughout as back-up to the satellite system. The ground-based infrastructure will be rolled out nationwide by about 2013. Aircraft are not required to be equipped with ADS-B until 2020. Until then, the nation will rely on operators to equip voluntarily to derive safety benefits and operate more efficiently in the mid-term.

Currently, the knowledge and understanding of ADS-B appears somewhat limited to the people who have been working on it for years. Greater clarity, understanding, consensus and action are needed to begin delivering the safety, capacity and efficiency benefits of ADS-B sooner than 2020.

ACSS, an L-3 Communications & Thales Company, is a leader in safety avionics systems with products that provide pilots with enhanced situational awareness, while increasing safety and efficiency for flight operations. ACSS is the surveillance provider of choice for major airlines, business and regional OEMs, and the global military and defense segment. Products include the industry leading TCAS 3000SP and TCAS 2000 traffic alert and collision avoidance systems; MASS, an enhanced TCAS for military operations; a family of Mode S transponders; TAWS+, a stand-alone terrain awareness warning system; and the T³CAS and T²CAS integrated surveillance platforms that combine functions such as TCAS, TAWS, Mode S and automatic dependent surveillance-broadcast (ADS-B) in a single line-replaceable unit. ACSS also offers a suite of ADS-B software modules designed to improve safety and efficiency for pilots and passengers operating in the airport vicinity called SafeRoute. To learn more about ACSS, visit the company's web site at www.acss.com.