Surveillance and Broadcast Services

Final ADS-B Out Rule Requirements

Presented to: AEA ADS-B Forum

By: Russell Gold AJE-6

Date: 8 FEB 2011

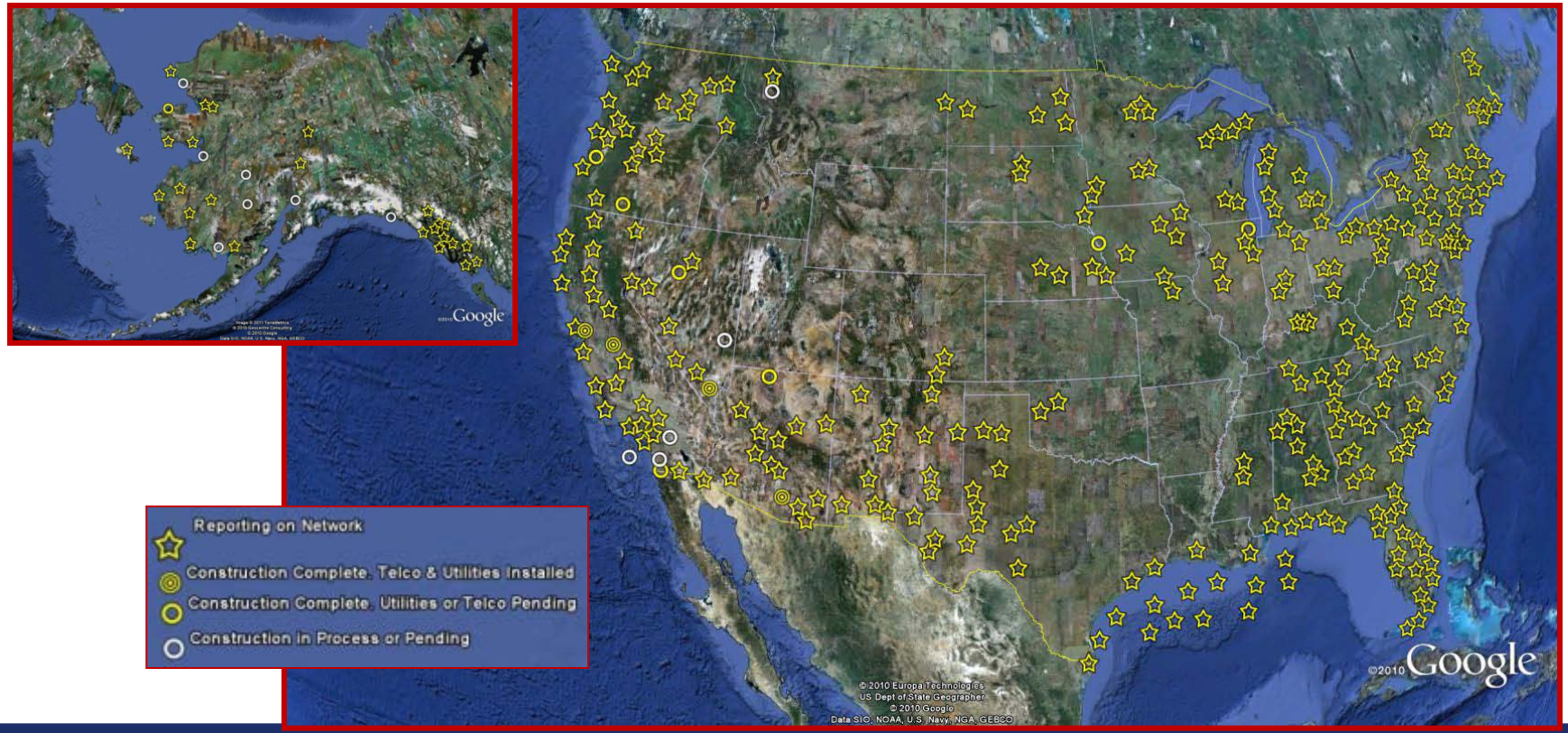
Federal Aviation Administration

Overview

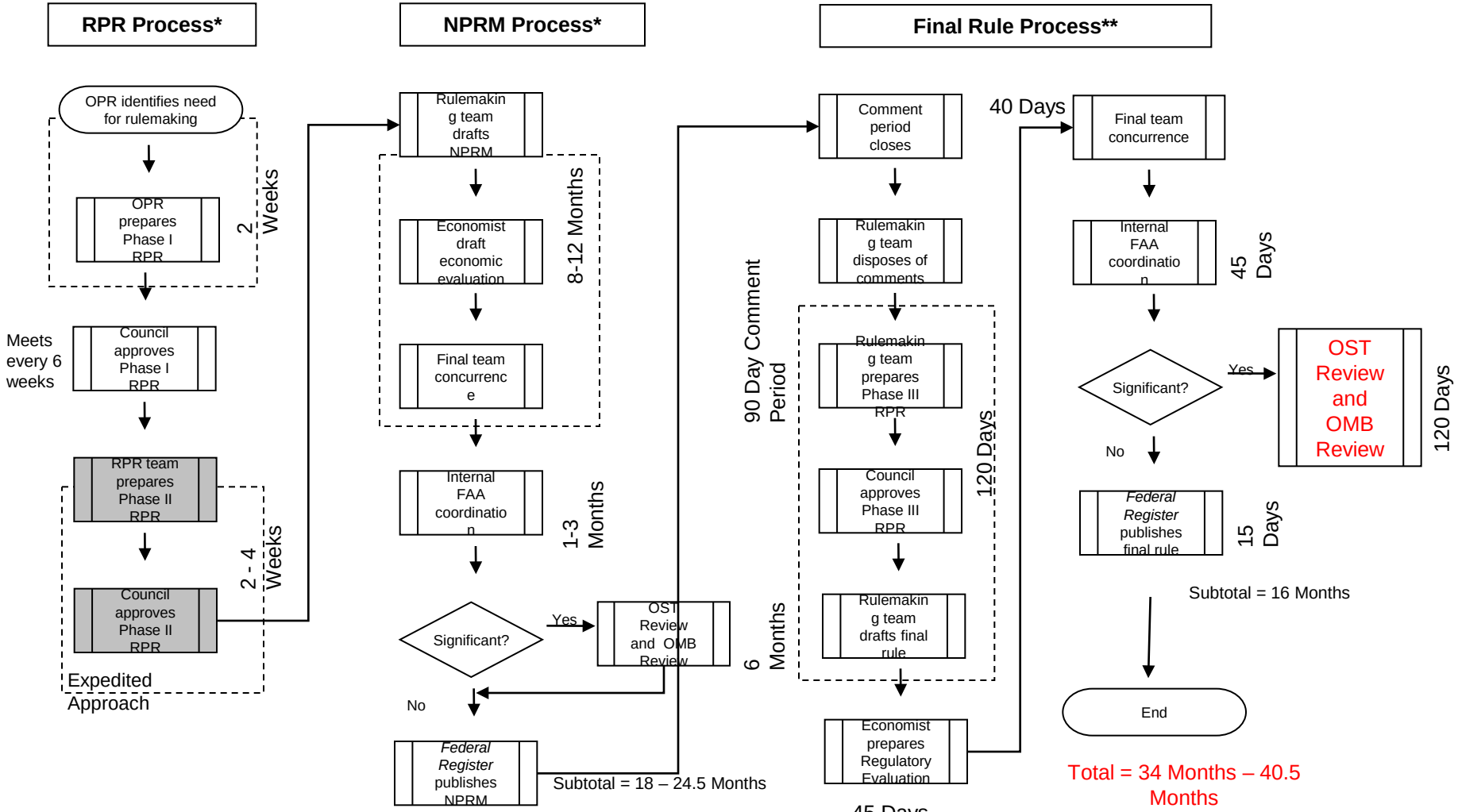
- **Review Rulemaking Process**
- **Deliberations and Recommendations**
- **Changes from NPRM to Final Rule**

Implementation Status: Year-End CY2010

- 320 Segment 1 sites (several Rocky Mountain and Alaskan sites awaiting Spring)
- 307 Segment 1 radio sites constructed (281 in CONUS; 26 in Alaska)
- 296 Segment 1 radio sites reporting on the network (271 in CONUS; 25 in Alaska)
- 205 radio sites have achieved Initial Operating Capability (IOC) [Miami Center (ZMA), Gulf of Mexico, Louisville (SDF), Philadelphia (PHL), Juneau (JNU), Boston Center (ZBW), New York Center (ZNY), Jacksonville Center (ZJX), Cleveland Center (ZOB), Atlanta Center (ZTL), Washington Center (ZDC), Chicago Center (ZAU), Seattle Center (ZSE), Albuquerque Center (ZAB) and Minneapolis Center (ZMP)]



General Rulemaking Process



*Estimated durations and diagram provided by AVS/Mitre

**Source: FAA Office of Rulemaking Quality Management System Rulemaking Manual; Average timeframes provided, actual timeframes depend on size and complexity of project

Rulemaking Comments Received

- **Comments Received**
  - Approximately 190 commenters on the NPRM
  - Approximately 50 commenters on ARC recommendations
  - Commenters included 6 air carriers, 5 aircraft manufacturers, 9 avionics manufacturers, 19 associations, and the DoD
- **The ARC made 36 Recommendations**
  - 13 Adopted
  - 15 Partially Adopted
  - 8 Not Adopted

Substantive Changes in the Final Rule

Issue Area	The NPRM—	The final rule—
Technical Standard Order	Proposed performance standards defined in TSO–C166a (1090ES) or TSO–C154b (UAT)	Requires performance standards as defined in TSO–C166b (1090ES) or TSO–C154c (UAT)
Airspace	Proposed to require all aircraft above flight level (FL) 240 to transmit on the 1090ES datalink	Requires all aircraft in Class A airspace (FL180 and above) to transmit on the 1090ES datalink
	Proposed ADS–B performance standards for operators in all Class E airspace at and above 10,000 feet MSL	Requires ADS–B performance standards for operators in Class E airspace at and above 10,000 MSL feet, excluding the airspace at and below 2,500 feet AGL
Antenna Diversity	Proposed antenna diversity in all ADS–B mandated airspace	Removes antenna diversity requirement in all ADS-B mandated airspace
NACp	Proposed a NACp $\geq$ 9 (less than 30 meters)	Requires NACp less than 0.05 NM (92.6 meters; equivalent to NACp of 8)
Probability of Exceeding Integrity Containment (New)	Originally included with SIL, with a requirement of 1×10^{-5} or 1×10^{-7}	Now included with NIC, with a minimum requirement set to 1×10^{-7}
Latency	Proposed a latency in the position source less than or equal to 0.5 seconds and latency in the ADS–B source less than or equal to 1 second	Requires uncompensated latency less than or equal to 0.6 seconds and maximum total latency less than or equal to 2.0 seconds
Time to Indicate Integrity Changes	Proposed aircraft transmit changes in NIC, NAC and SIL within 10 seconds	Requires that aircraft transmit changes in NIC, NAC, and SIL within 12 seconds
Message Elements	Proposed a broadcast message element for “receiving ATC services” and “length/width”	Does not require broadcast message element for “receiving ATC services”
An ability to turn off ADS–B Out	Proposed ability for the pilot to turn off ADS–B transmissions if directed by ATC	Does not require the pilot be able to disable or turn off ADS–B transmissions

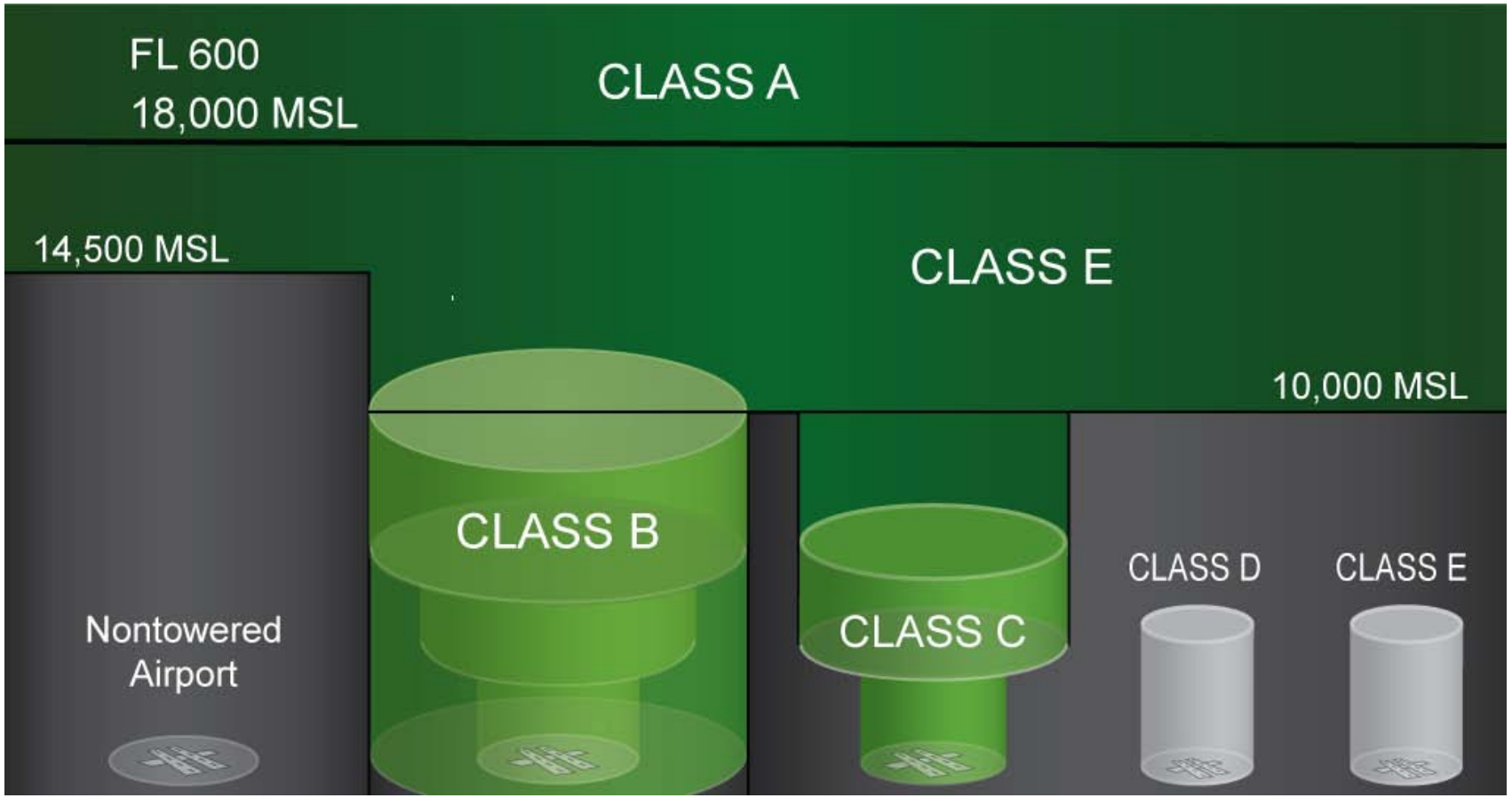
Performance Requirements of the Rule

NAC	8	Horizontal accuracy < 92.6 meters (0.05 NM)
NIC	7	Containment radius <0.2 NM
SIL	3	Probability of exceeding the horizontal NIC containment radius ≤ 1×10^{-7} per flight hour or per sample (Severe Major/Hazardous Classification)
SDA	2	Design Assurance Level of actual avionics equipment ≤ 1×10^{-5} per flight hour or per sample

Affected airspace

- **ADS-B Performance is required in the following airspace:**
  - Class A, B, and C airspace
  - Above 10,000 feet MSL in Class E airspace (except in Hawaii and Alaska) excluding the airspace at and below 2,500 feet AGL
  - Below 10,000 feet above the surface within a 30-nautical-mile radius of airports listed in the transponder rule (see Appendix A)
  - In the Gulf of Mexico out to 12 nautical miles from the Gulf Coast, from 3,000 feet MSL upwards.

Affected airspace



Next steps

- **The SBS Program Office is aggressively pursuing partnership agreements with GA and commercial operators to demonstrate clear operational benefits to those who equip early.**

- **FOR IMMEDIATE RELEASE**
- **Date: February 3, 2011**
- Contact: Paul Takemoto
- Phone: 202-267-3883
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- **FAA, JetBlue Agreement to Bring NextGen Precision to**
- **East Coast, Caribbean Routes**
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- WASHINGTON – The U.S. Department of Transportation's Federal Aviation Administration (FAA) announced today that the FAA and JetBlue have signed a NextGen agreement that will allow the airline to fly more precise, satellite-based flights from Boston and New York to Florida and the Caribbean beginning in 2012.
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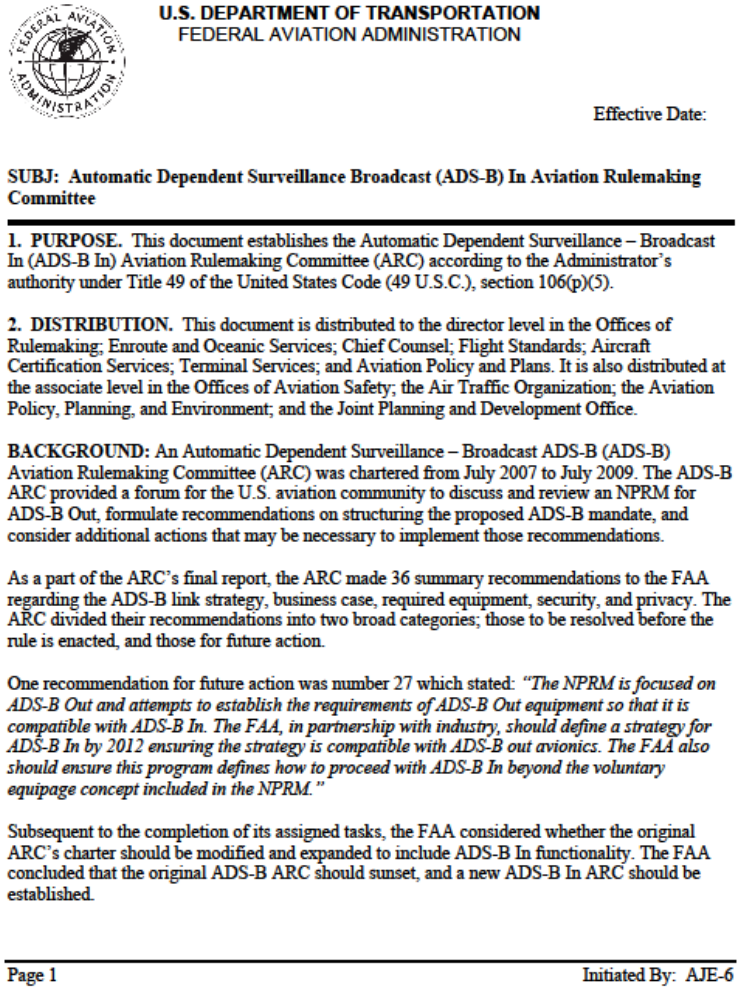
- NextGen is the transformation of the U.S. national airspace system from a ground-based system of air traffic control to one based on satellites, which will enhance safety and reduce aviation congestion. Today's NextGen announcement follows President Obama's State of the Union Address last week, in which he stressed the importance of targeted investments to foster American innovation that will make our nation more competitive globally and strengthen our economy here at home.

ADS-B In

- **We also heard loud and clearly from industry that ADS-B IN is essential to NextGen.**
- **The next deliverable from the ARC is a preliminary preferred strategy for moving forward with ADS-B In.**



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Effective Date:

SUBJ: Automatic Dependent Surveillance Broadcast (ADS-B) In Aviation Rulemaking Committee

1. PURPOSE. This document establishes the Automatic Dependent Surveillance – Broadcast In (ADS-B In) Aviation Rulemaking Committee (ARC) according to the Administrator's authority under Title 49 of the United States Code (49 U.S.C.), section 106(p)(5).

2. DISTRIBUTION. This document is distributed to the director level in the Offices of Rulemaking; Enroute and Oceanic Services; Chief Counsel; Flight Standards; Aircraft Certification Services; Terminal Services; and Aviation Policy and Plans. It is also distributed at the associate level in the Offices of Aviation Safety; the Air Traffic Organization; the Aviation Policy, Planning, and Environment; and the Joint Planning and Development Office.

BACKGROUND: An Automatic Dependent Surveillance – Broadcast ADS-B (ADS-B) Aviation Rulemaking Committee (ARC) was chartered from July 2007 to July 2009. The ADS-B ARC provided a forum for the U.S. aviation community to discuss and review an NPRM for ADS-B Out, formulate recommendations on structuring the proposed ADS-B mandate, and consider additional actions that may be necessary to implement those recommendations.

As a part of the ARC's final report, the ARC made 36 summary recommendations to the FAA regarding the ADS-B link strategy, business case, required equipment, security, and privacy. The ARC divided their recommendations into two broad categories; those to be resolved before the rule is enacted, and those for future action.

One recommendation for future action was number 27 which stated: *"The NPRM is focused on ADS-B Out and attempts to establish the requirements of ADS-B Out equipment so that it is compatible with ADS-B In. The FAA, in partnership with industry, should define a strategy for ADS-B In by 2012 ensuring the strategy is compatible with ADS-B out avionics. The FAA also should ensure this program defines how to proceed with ADS-B In beyond the voluntary equipage concept included in the NPRM."*

Subsequent to the completion of its assigned tasks, the FAA considered whether the original ARC's charter should be modified and expanded to include ADS-B In functionality. The FAA concluded that the original ADS-B ARC should sunset, and a new ADS-B In ARC should be established.

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Questions / Comments

Russell Gold
SBS Program Office
(202)385-6256

russell.gold@ faa.gov