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Agenda Item 4 Other matter

ADS-B IMPLEMENTATION "FACES MYRIAD OF RISKS" (US DOT IG)

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| <h4>Summary</h4> |
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| <p>This information paper presents information on ADS B risk implementation made by the Department of Transportation (DOT IG) of the United States</p> |
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1 ADS implementation risks

1.1 The Department of Transportation's Inspector General Calvin L. Scovel III told Congress that the widespread introduction of ADS-B (automatic dependent surveillance-broadcast) in the U.S. "faces a myriad of risks," which could materially affect its cost, schedule, and expected benefits.

1.2 According to Mr. Scovel, the risks for a successful ADS-B implementation include its acceptance by users; concerns about frequency congestion on the Mode-S broadcast link; development and approval of ADS-B-based air traffic procedures; and necessary adjustments to existing controller displays and related automation systems.

1.3 In his [October 17th testimony](#) before the House Committee on Transportation and Infrastructure Subcommittee on Aviation, Mr. Scovel raised three major concerns, which are elided and summarized here:

1.3.1 While the FAA plans for the ground infrastructure of ADS-B to be in place by 2013, ADS-B won't provide near-term relief from delays at America's most congested airports. The majority of expected benefits that can increase capacity and reduce delays will come from "ADS-B-In" applications, but the FAA, in its just released NPRM (notice of proposed

rulemaking) is only mandated "ADS-B-Out" equipment. Most airspace users are not expected to be equipped with new avionics needed for ADS-B-Out procedures until 2020.

(ADS-B-Out broadcasts of information from aircraft to ground systems and other aircraft. ADS-B-In allows aircraft to accept information that can be used for purposes of pilot surveillance and self-separation.)

1.3.2 While ADS-B has demonstrated important benefits in Alaska where radar coverage is limited, its implementation in the continental U.S. – which involves supplementing and ultimately replacing radar – is a complex undertaking. ADS-B must demonstrate the same level of service that radar now provides, before the FAA even considers other benefits, such as reducing distances between aircraft.

1.3.3 The FAA's decision to rely on a service contract approach for ADS-B means the government won't own the ADS-B ground infrastructure but will pay for broadcast services. (The FAA will, however, own the data and certify the ADS-B service.) While the FAA intends to use several controls to help manage the contract, these controls aren't yet fully in place, and after they are established, the FAA still must execute them properly.

2 Risks That Must Be Mitigated

2.1 ADS-B implementation across the continental U.S. will require coordinated investments between FAA and the industry over the next decade. The IG identified five major risks that will have a direct bearing on the cost, schedule, and expected benefits of ADS-B:

2.1.1 **Stakeholder Acceptance and Aircraft Equipage.** There is justifiable skepticism in the aviation community about equipping with new avionics to support revolutionary technologies because of past experience. For example, the FAA cancelled a MLS (microwave landing system) in the 1990s because of industry concerns and opposition, and a CPDLC (controller-pilot datalink communications) initiative in 2003 because of uncertain benefits, technical problems, and cost growth issues. Stakeholders are concerned that ADS-B could become another situation where some industry members equip and FAA never follows through with the requisite ground infrastructure or mandate.

2.1.2 **Link Frequency Congestion.** There is concern that the frequency (1090 MHz) planned for airlines and other large aircraft operators will become overcrowded with the addition of ADS-B signals. Currently, the same frequency is used for other important systems, including ground-based secondary radar, runway incursion systems, and TCAS (traffic alert and collision avoidance system). This is one reason that FAA decided to rely on two separate frequencies for ADS-B.

2.1.3 **Integrating ADS-B with Existing Automation Systems.** Nationwide ADS-B implementation will require a significant modification of existing automation systems, such as controller displays, and new automation platforms such as ERAM (en route automation modernization) and STARS (standard terminal automation replacement system).

2.1.4 **ADS-Based Aircraft Separation.** The FAA must be able to confirm that ADS-B can separate aircraft at least as well as, if not better than, radar.

2.1.5 **Potential Security Vulnerabilities.** Because ADS-B makes the position of aircraft in flight generally available, some are concerned about the possibility of introducing false targets into the system.

3 How Risks Might Be Mitigated

3.1 Notwithstanding the IG's concern about these risks, its report suggests ways that experts believe they can be mitigated.

- **User Equipage.** Many in the industry and FAA believe that incentives will be required to help spur aircraft equipage. Whether or not incentives should be used is a policy decision for Congress, but we think full consideration of their timing and impact is needed. The FAA-established Aviation Rulemaking Committee (ARC) made such recommendations in a [recently released report](#).
- **Frequency Congestion.** The FAA plans to sponsor research on the affect of frequency congestion for ADS-B and other users of the 1090 MHz spectrum in congested airspace, and find potential solutions.
- **Integration.** An important step to realize the benefits of ADS-B is the development and implementation of "fusion," defined as taking all surveillance data available for an aircraft and using the best data or combination of data to determine aircraft position and intent. Industry groups have asked FAA to accelerate its work on this technique, and the IG believes the FAA needs to determine its requirements and the best approach for its implementation.
- **Aircraft Separation.** Research performed by the Massachusetts Institute of Technology/Lincoln Labs, the Johns Hopkins University/Applied Physics Laboratory, and the MITRE Corporation, show that ADS-B should be able to provide surveillance that is at least as good as radar if not better. However, automation systems will need to compensate for differences in ADS-B and radar update and error rates, which underscores the need for fusion. Still, the IG believes ADS-B performance must be demonstrated and tested in the real-world, and the FAA must validate and certify ADS-B procedures.
- **Security.** A security assessment is needed to determine ADS-B risks and appropriate countermeasures. The FAA needs to continue to work with the intelligence community and the Departments of Defense and Homeland Security to ensure that concerns about ADS-B security are adequately addressed.
