

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 1: Introduction and assessment of a global air traffic management (ATM) operational concept

**1.2 Enabling concepts in support of the global ATM operational concept
:**

**INITIAL AUTOMATIC DEPENDENT SURVEILLANCE —
BROADCAST (ADS-B) APPLICATIONS FOR GLOBAL
INTEROPERABILITY**

(Presented by United States)

SUMMARY This working paper proposes an approach for ICAO standardization and the global introduction of automatic dependent surveillance — broadcast (ADS-B) applications.
REFERENCES 1. “Strategy for global interoperability of automatic dependent surveillance broadcast (ADS-B)”, working paper to the Eleventh Air Navigation Conference (AN-Conf/11), Agenda Item 7 2. Automatic dependent surveillance — broadcast (ADS-B) concept of use.” ICAO Operational Data Link Panel (OPLINKP), AN-Conf/11-WP/6.

1. INTRODUCTION

1.1 The United States Federal Aviation Administration (FAA) and RTCA are working closely with the European States and organizations to define, develop and implement an initial set of ADS-B enabled operational applications. These ADS-B applications are proposed to serve as the basis for promoting global interoperability of ADS-B enabled operations for both the near-term and beyond. The proposed initial set of ADS-B applications is consistent with the draft “Automatic dependent surveillance broadcast (ADS-B) concept of use” developed by the ICAO Operational Data Link Panel (OPLINKP).

2. OVERVIEW OF THE UNITED STATES COORDINATION WITH EUROPEAN ACTIVITIES

2.1 The EUROCONTROL CARE/ASAS activity has identified an initial set of air-to-ground surveillance and air-to-air surveillance operational applications enabled by ADS-B, known as “Package-1.” These applications are suitable for core European high-density traffic areas without excluding other areas, in line with the EUROCONTROL ATM 2000+ strategy and the expected operational improvements. These applications were also coordinated between the various European ADS-B related programs and projects through the Joint Coordination Board (JCB). Package-1 applications have acquired wide consensus and endorsement by the stakeholders. Significant international coordination of these applications has also occurred through the activities of the FAA/EUROCONTROL Research and Development Committee’s Action Plans 1 and 10. Package-1 applications include the following:

2.2 Five ground surveillance applications:

- a) ATC surveillance for en-route airspace;
- b) ATC surveillance in terminal areas;
- c) ATC surveillance in non-radar areas;
- d) airport surface surveillance; and
- e) aircraft derived data for ground tools.

2.3 Seven airborne surveillance applications:

- a) enhanced traffic situational awareness on the airport surface;
- b) enhanced traffic situational awareness during flight operations;
- c) enhanced visual acquisition for see and avoid;
- d) enhanced successive visual approaches;
- e) enhanced sequencing and merging operations;

- f) in-trail procedure in oceanic airspace; and
- g) enhanced crossing and passing operations.

2.4 Note that these applications are also consistent with the United States National Airspace System (NAS) Concept of Operations, and do not fall outside the scope of near-term ADS-B capabilities as envisioned for implementation in the United States as described below.

3. OVERVIEW OF THE UNITED STATES ADS-B ACTIVITIES

3.1 The plan for implementing an initial package of ADS-B services in the United States NAS consists of two phases. Phase 1 concentrates on developing ADS-B applications and establishing pockets of implementation to enable initial operational use of ADS-B and stimulate user equipage. Phase 2 concentrates on the development and deployment of ADS-B ground infrastructure nationwide.

3.2 Phase 1 activities are built around pursuing those applications and benefits that are expected in the near term to stimulate user equipage with ADS-B avionics. Near-term initiatives are focused on aircraft-to-aircraft applications of ADS-B not requiring a NAS-wide ground ADS-B infrastructure, and on aircraft-to-ground applications of ADS-B where benefits can be achieved with a limited ground ADS-B infrastructure. Initial locations, or “pockets,” for this limited infrastructure include: Memphis, TN and Louisville, KY in the Ohio River Valley; southwestern Alaska in and around Bethel, AK; southeastern Alaska in and around Juneau, AK; Prescott, AZ and Daytona, FL training locations of Embry-Riddle Aeronautical University; and selected sites along the east coast of the United States. Applications to be supported in these pockets include (but are not limited to) air traffic control (ATC) surveillance in non-radar areas, ATC surveillance in terminal areas, enhanced traffic situational awareness on the airport surface, enhanced traffic situational awareness during flight operations, enhanced visual acquisition for see and avoid, and enhanced successive visual approaches.

3.3 Phase 2 consists of all the activities needed to achieve nationwide ADS-B capabilities. The operational and technical results of near-term initiatives will be leveraged to support investments and deployments for national use. The investment analyses for FAA-funded ADS-B ground infrastructure deployments will be conducted to determine overall system requirements, costs, and benefits of implementing ADS-B infrastructure nationwide, and ensuring interoperability with international ADS-B capabilities. Required automation changes and improvements, integration into the ATC system, and other issues will be examined carefully to ensure the successful implementation of ADS-B capabilities in the NAS.

3.4 The FAA and the United States aviation industry are supporting RTCA activities to develop the necessary standards associated with ADS-B. A number of such standards have already been published and work is progressing for the development of the standards associated with the initial ADS-B applications. RTCA is in close coordination with EUROCAE for much of their ADS-B standards work.

4. **A UNITED STATES/EUROPEAN COORDINATED APPROACH FOR THE INTRODUCTION OF ADS-B ENABLED APPLICATIONS**

4.1 Joint European/United States development and implementation of Package-1 applications plays a key role in the success of the United States plans for implementing ADS-B in the NAS. Most of the applications identified under the European defined Package-1 are already being developed and evaluated in the United States as part of the FAA's Safe Flight 21 program, and are crucial to the implementation of "pockets" of initial ADS-B capabilities; all Package-1 applications as well are consistent with both the European ATM 2000+ strategy and the United States NAS Concept of Operations. The United States FAA has agreed to adopt the terminology proposed by EUROCONTROL for the Package-1 set of ADS-B applications. Joint RTCA/EUROCAE development of technical standards in support of these applications is also underway. In addition, the FAA and EUROCONTROL, as well as the United States and European stakeholders, have identified/accepted 1090 MHz extended squitter as the common near-term ADS-B link to promote international interoperability; all Package-1 applications will be supported by this common link (see Reference 1) and airborne implementations are already underway.

5. **ACTION BY THE CONFERENCE**

5.1 The conference is invited to agree on the following recommendation:

Recommendation 1/ - Initial ADS-B applications for global interoperability

That ICAO:

- a) Accept the Package-1 set of ADS-B applications, as being defined and validated by joint United States/European activities, to be used as the basis for ICAO activities to define the operational provisions for an initial global set of ADS-B applications; and
- b) Accept the forthcoming joint RTCA and EUROCAE technical standards for the Package-1 ADS-B applications as the basis for the development of ICAO Standards and Recommended Practices (SARPs) and guidance material.

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