International Civil Aviation Organization

Sixth Meeting of the Surveillance Implementation Coordination Group (SURICG/6)

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Agenda Item 8 Update on surveillance activities and explore potential cooperation opportunity

a) States/Administrations

REPORT ON ADS-B IN RETROFIT SPACING (AIRS) EVALUATION PROJECT

(Presented by United States/Federal Aviation Administration)

SUMMARY

This paper reports on the ADS-B In Retrofit Spacing (AIRS) evaluation project, a large-scale operational evaluation of ADS-B In applications. The project engages the FAA with ACSS and American Airlines (AAL) in a public-private partnership to equip over 300 AAL A321 aircraft with an ADS-B-In retrofit solution that supports Cockpit Display of Traffic Information (CDTI)-Assisted Visual Separation (CAVS) and Interval Management (IM) capabilities.

1. INTRODUCTION

1.1. The ADS-B In Retrofit Spacing (AIRS) evaluation project was kicked off in September 2017, with the aim of conducting a large-scale operational evaluation of two ADS-B In capabilities: Cockpit Display of Traffic Information (CDTI)-Assisted Visual Separation (CAVS) and Interval Management (IM). The project engages the FAA with ACSS and American Airlines (AAL) in a public-private partnership to equip over 300 AAL A321 aircraft with an ADS-B-In retrofit solution providing CAVS and IM functionality.

1.2. The AAL A321 fleet are outfitted with two different engine types: the conventional engine option (A321ceo) and the new engine option (A321neo). The aircraft have two different types of ACSS TCAS units, the TCAS-3000SP (installed on A321ceo aircraft) and the T^{3}CAS (installed on A321neo aircraft).

1.3 The FAA AAL ACSS ADS-B In Retrofit Spacing Evaluation (AIRS Eval) project meets multiple FAA objectives:

- Promote early adoption of ADS-B In applications by fielding a cost-effective retrofit solution
- Collect large-scale operational data over an extended period to evaluate benefits
- Exercise FAA's processes for making ADS-B In applications extensible throughout the NAS.

1.4 This paper reports on the progress of the AIRS Eval project.

2. DISCUSSION

2.1 ACSS has developed certified avionics that are an extension of the previously certified SafeRoute™ product. The new retrofit architecture leverages the use of an ADS-B Guidance Display (AGD) mounted in the instrument panel and is expected to make ADS-B In retrofit upgrades cost-effective on many aircraft types. The CAVS avionics functionality has been certified to TSO-C195b. The ACSS Spacing application meets approximately half of the requirements in DO-361/ED-236, "Minimum Operational Performance Standards for Flight-deck Interval Management (FIM)." However, the supported functionality will provide opportunities to collect relevant operational data for arrivals into Phoenix Sky Harbor International Airport.

2.2 AAL received FAA operational approval and began conducting CAVS operations in May 2021. CAVS arrival operations do not require ATC involvement and can be performed at any airport. Benefits data gathering has begun.

2.3 Avionics certification for SafeRoute on the TCAS-3000SP is complete and installations in AAL A321 aircraft have begun; as of 30-Jul-2021, 58 AAL A321 aircraft have been equipped. Avionics development for SafeRoute functionality hosted on the T3CAS is complete and certification test flights occurred in late January 2021; equipage is expected to begin after September 2021. IM Spacing operations will begin once enough A321s are equipped; the number of equipped A321s needed to initiate IM spacing operations depends on the expected ratio of equipped aircraft to non-equipped aircraft in the airspace. Prior to the downturn in commercial air traffic due to COVID-19, it was expected that approximately 120 aircraft needed to be equipped. The number of aircraft needed to begin the evaluation is currently being revisited, but for planning purposes, operations are tentatively expected to begin in mid-2022. Benefits data will be gathered for one year after IM Spacing operations commence.

2.4 IM Spacing operations are limited to airspace where controllers have an indication of which aircraft are equipped and have methods to assign proper spacing goals. For the AIRS Eval, initial IM operations are planned for westbound arrivals through Albuquerque Air Route Traffic Control Center (ZAB) to Phoenix Terminal Radar Approach Control (P50) airspace. Westbound arrivals through ZAB carry about half of the arrival traffic into P50. Initial IM clearances will be issued by ZAB controllers prior to the top of descent and may terminate at the P50 boundary. The potential exists to continue the IM operation through P50 to the final approach fix. The controllers will not have any special ground automation support for this operational evaluation; a method will be provided to inform controllers which aircraft are capable of performing IM and what spacing goals should be assigned to the aircraft.

2.5 FAA and AAL are also planning to conduct an operational trial using CAVS avionics functionality in ceiling and visibility conditions that would not currently qualify for "pilot-applied visual separation" in the U.S. under FAA Order 7110.65, "Air Traffic Control." This operation is referred to by FAA and AAL as "CDTI-Assisted Separation" (CAS). This operational trial is tentatively planned to commence in 2022 for AAL A321 aircraft arriving at the Dallas-Fort Worth International Airport (KDFW). Like the other trials under this project, benefits data will be gathered for one year after operations commence.

2.5.1 The objective of CAS is to maintain visual-like separation safely and more efficiently from a lead aircraft using the CDTI during instrument approach procedures. Like CAVS, there is no spacing goal. Rather, the flight crew uses the information displayed on the CDTI to allow the spacing

to decrease to less than that which can be currently allowed using radar separation. The resulting spacing is up to the discretion of the flight crew. It is expected to recapture some of the runway capacity benefits of visual separation operations during weather conditions that do not support visual approach with pilot-applied visual separation.

2.5.2 CAS can only be used when both the lead aircraft and the following CAS aircraft are flying an instrument approach to the same runway. The CAS operation is initiated by the controller, who provides an instrument approach clearance and a CAS instruction that includes the Flight ID of the preceding (or lead) aircraft. The flight crew identifies the lead aircraft on the CDTI based on the Flight ID provided by the controller, and visual acquisition is not required. After traffic identification and designation, the flight crew uses the lead aircraft information available on the CDTI to conduct pilot-applied separation operations.

2.5.3 CAS can be conducted when the airport of intended landing has a reported ceiling of 1000’ or greater and visibility of 3 statute miles or greater. The aircraft conducting a CAS operation may enter Instrument Meteorological Conditions (IMC) conditions during arrival and approach.

2.5.4 CAS is mainly intended for air transport aircraft arriving into capacity-limited airports, but it can be used by all capable aircraft during approach to any airports where instructions for maintaining pilot-applied visual separation from the lead aircraft are used.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate

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