International Civil Aviation Organization

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Agenda Item 6: Review States' activities and interregional issues on trials and implementation of ADS-B and multilateration

ADS-B VALIDATION SYSTEM DEVELOPMENT PROGRESS IN KOREA

(Presented by Republic of Korea)

SUMMARY

This paper presents the system architecture, system components, and operational concepts of ADS-B validation system (AVS) that is under development funded by Korean Government.

1. INTRODUCTION

1.1 The ADS-B Validation System (AVS) is an operational validation tool which is a part of ADS-B system that is under development funded by The Ministry of Land, Transport and Maritime Affairs (MLTM) of Korea. The purpose of the AVS is to support the validation of ADS-B system in terms of operation for enhanced air traffic services in radar-controlled areas using ADS-B surveillance (ADS-B-RAD) and enhanced airborne traffic situational awareness for surface (ATSA-SURF).

1.2 As a technical and operational validation test tool, AVS provides ADS-B subsystems with simulated surveillance sensor target reports and system tracks to support validation of subsystems of ADS-B system. AVS also allows for the tests for interoperability and performance with integrated ADS-B system based not only on simulation data but also on the real flight data.

1.3 The main features of AVS are summarized as:

a) Aircraft trajectory generation
b) ADS-B and radar sensor simulation
c) System track generation
d) Test results assessment for performance and interoperability

2. ADS-B VALIDATION SYSTEM

System Components and Architecture

2.1 The ADS-B Validation System (AVS) is a supporting system for validation of ADS-B ground/on-board system. The AVS consists of:

a) Trajectory Generation Server (TGS)
b) Sensor Simulation Server (SSS)
c) Surveillance Data Processing System (SDPS)
d) Flight Simulator (FLS)
e) Control & Monitoring Console (CMC)

2.2 Trajectory Generation Server (TGS): The AVS includes TGS which generates realistic aircraft trajectories based on information from flight plans. The information in flight plans is interpreted and reconstructed into several segments that are used for trajectory modelling. The aircraft trajectories are sent to sensor simulation server (SSS) in real-time and SSS generates the corresponding ADS-B and radar data.

2.3 Sensor Simulation Server (SSS): The AVS has SSS as a component. SSS simulates surveillance sensors such as ADS-B ground stations and radars using aircraft trajectories transmitted from TGS in real-time. SSS also generates simulated TIS-B data incorporated with the link errors and sends them to flight simulator (FLS).

2.4 Surveillance Data Processing System (SDPS): The AVS incorporates the state-of-the-art multi-sensor tracker named SDPS, which can handle target reports from not only radar (PSR/SSR Mode-A/C/S) but also ADS-B and MLAT. The target reports are processed and fused into system tracks, which are used for air situation display and TIS-B.

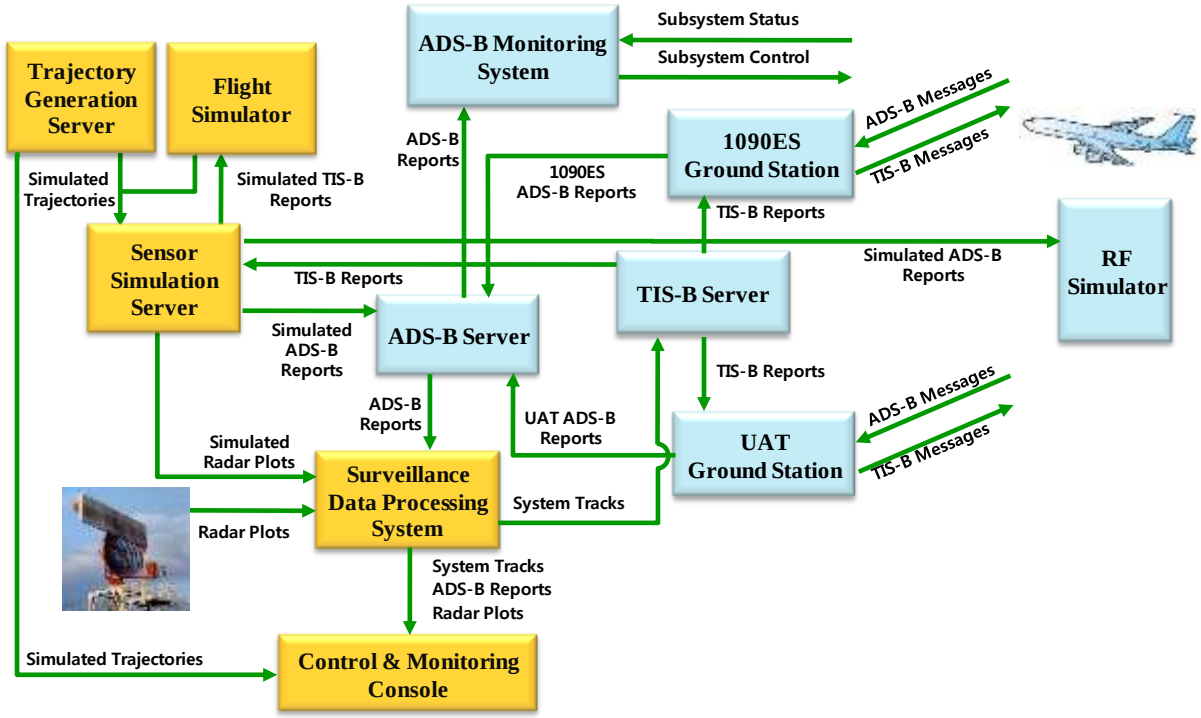
2.5 Flight Simulator (FLS): The AVS includes a flight simulator (FLS) for the pilot interfaces. FLS has a simulated CDTI for air/ground situation display. It facilitates the pilot to validate the ADS-B system in terms of the enhanced airborne traffic situational awareness.

2.6 Control & Monitoring Console (CMC): Control & monitoring console (CMC) as a component of AVS is responsible for control and monitoring of whole AVS system. It can be used for four modes including supervising, traffic emulation, pseudo piloting, and air situation display. All the actions for AVS components except pilot action in flight simulator (FLS) are done in CMC. CMC also receives all the information from the subsystems of AVS and generates the results for validation of ADS-B system. Record and playback is one of the features of CMC.

Operational Scenarios

2.7 The AVS will be used for validation tests of ADS-B system during field tests as well as laboratory tests. The laboratory tests that will be mainly performed before field tests will use simulated target reports with sensor errors for the validation. The simulated ADS-B reports generated by SSS using the aircraft trajectories from TGS and/or FLS are sent to RF simulator. (Optionally, the simulated ADS-B reports can be provided directly to ADS-B server.) The simulated ADS-B reports are then transmitted to ADS-B ground stations which provide ADS-B server with the data in the format of ASTERIX category 21. ADS-B data from ADS-B server will be sent to SDPS for the processing. The system tracks from SDPS will be transmitted via TIS-B server to the CDTI in the cockpit for situation awareness for the pilots. These processes described above will allow for the end-to-end surveillance system tests in the laboratory.

2.8 The AVS will also support the operational validation during field tests. One of main test items which AVS will be involved in is the comparison of ADS-B data with radar data. The possible anomalies in data from ADS-B system will be identified through the comparison with radars using AVS.



3. CONCLUSION AND FUTURE PLAN

3.1 AVS is being developed for the validation of ADS-B systems, which are also under development currently in Korea. With its integrated air traffic/sensor simulation systems, surveillance data processing system, and monitoring system, AVS will be used for end-to-end surveillance system validation in both laboratory tests and field tests of ADS-B system.

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