Chapter 6
Air Traffic Monitoring Using ADS-B System

ABSTRACT
This chapter describes the system created for ADS-B messages receiving. For this an antenna, ADS-B signals receiver, a decoder was made and software was installed. This system was allocated at the Department of Air Navigation Systems in the National Aviation University and was used for students training and investigations. Original software for modeling of real-time TCAS operation was developed using MATLAB. The experimental model with data exchange between onboard systems via Wi-Fi network was created. This model was used for modeling of aircraft approaching. Such model can be used as a base for creation a collision avoidance system of RPAS.

INTRODUCTION
Advantages of ADS-B
ADS-B is a new surveillance technology and is designed to modernize aviation to next generation (NextGen and Single European Sky) transport systems. The ADS-B allows ATC to control aircraft with greater accuracy and over a much larger portion of the earth’s surface than ever before. For NextGen and SESAR, ADS-B technology is one of the most important in terms of converting ATC from the use of radar surveillance to the satellite global positioning system GPS. ADS-B uses a combination of satellites, transmitters and receivers to

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provide flight crews and ground control personnel with specific information on the location and speed of aircraft in the area. Navigation satellites give the exact time. Unlike conventional radar, ADS-B operates at low altitudes and on land, can be used to monitor traffic on taxiways and airport runways. ADS-B is also effective in remote areas where there is no radar coverage or where radar coverage is limited.

Advantages of ADS-B are as follows (Richards, O’Brien, & Miller, 2010):

- ADS-B makes it possible to maintain or improve existing safety standards while increasing the efficiency and power of the system.
- ADS-B significantly improves situational awareness of the crews, since they know where the other planes are.
- ADS-B provides an overall picture of real-time monitoring and the ability to exchange information quickly if necessary, if other aircraft deviate from their prescribed flight paths.
- ADS-B offers more accurate and more frequently updated generalized information about traffic. All participants in the flights have a common operational picture.
- ADS-B provides more accurate and timely information than radiolocation; provides more frequent updates than radar.
- ADS-B significantly improves the detection of possible conflicts and their resolution compared to any other system.
- ADS-B can provide a significant increase in the number of flights that can be serviced by the ATC. More aircraft can simultaneously occupy this airspace while changing the separation standards.
- ADS-B significantly reduces the separation standards while maintaining safety standards, improves the accuracy and integrity of reports.
- Increases runway capacity with improved arrival accuracy to the metering fix.
- Helps maintain runway approaches using a cockpit display of traffic information in marginal visual weather conditions.
- Enhances visibility of all airplanes in the area to allow more airplanes to use the same runway.
- Allows 5 nmi of separation in non-radar airspace compared to current procedural separation, from 5 to 3 nmi in radar airspace.
- ADS-B improves flight efficiency, and also increases throughput.
- This helps the ATC understand the actual separation between airplanes and allows controllers to avoid inefficient vectoring. This helps aircraft
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