CHAPTER 1

INTRODUCTION

1.1. Background

The unavailability of the Automatic Dependent Surveillance – Broadcast (ADS-B) system in many regions and oceans around the world can lead to unreliable and inaccurate surveillance, of course such problems will endanger the aircraft being monitored because they may not be monitored by the local aviation regulatory agency. such as Air Traffic Control (ATC). In the current era of information disclosure, which is supported by technological sophistication, technology on aircraft has increased so rapidly, while in the navigation aspect there has been a tremendous increase, because everyone can monitor or supervise flights from the time the plane takes off and Landing) at the destination airport, this technology is called the Automatic Dependent Surveillance – Broadcast (ADS-B) system.

The Eleventh International Civil Aviation Organization (ICAO) Air Navigation Conference held in 2003 recommended that States recognize ADS-B as a proponent of the global Air Traffict Management (ATM) concept that brings substantial security and capacity benefits, supporting cost-effective early implementation , and ensuring it is aligned, compatible and interoperable with ATM operational procedures, data linking and applications [2]. In fact, the ADS-B system is predicted to replace the current conventional Radio Detecting and Ranging (Radar) [1]. And it is concluded that ADS-B surveillance is better or at least not worse than ordinary conventional radar [2]. Of course not only that, ADS-B provides an economical alternative to acquire capabilities [2]

The hardware of this ADS-B system is much smaller and simpler and covers the whole world because it uses satellites to monitor aircraft. Currently, 30 ADS-B units have been installed as shown in Figure 1. 1, which can cover all Indonesian airspace and have been integrated with the ATM System, in the Jakarta Automation Air Traffic Services (JATSC) for the Flight Information Region (FIR) for the Jakarta and Central areas. Makassar Air Traffic Service. (MATSC) (FIR Ujung Pandang) [1].

Figure 1. 1 Coverage ADS-B in 30 locations in Indonesia [1]

The advent of the ADS-B spacecraft will usher in an era in which aircraft can be tracked in areas of the ocean that are currently unattended. The CanX-7 nanosatellite will house the RMCC payload which will monitor the aircraft's ADS-B position over the North Atlantic [3]. The demonstration on orbit probe V has proven that space-based surveillance of the 1090ES ADS-B is technically feasible, and thus the objective of the "ADS-B via Satellite" project has been achieved [4]. The space-based ADS-B system providing worldwide coverage will consist of a fleet of satellites equipped with highly advanced multi-channel ADS-B receivers [4]. The world's first PROBA-V satellite with an ADS-B receiver was launched on 7 May 2013, which verified the feasibility of detecting ADS-B signals on board the aircraft. Because of the huge advantages of the space-based ADS-B system, many countries and organizations have invested in research. Dozens of satellites carrying ADS-B receivers have been launched, such as the GOMX series [5, 6] [7, 11] satellites, STU-2 satellites [8], TianTuo-3 [9] and Iridium-NEXT satellites. Among them, Iridium-NEXT has completed 66 satellite deployments and is the first constellation to achieve global aviation surveillance [10], [11]. The first ten Iridium NEXT satellites carrying hosted ADS-B payloads were placed in low Earth orbit (LEO) as part of a 66-satellite constellation projected to provide full Earth coverage for ADS-B signal reception [14].

1.2. Problem Identification

Most of the airports on the island of Papua do not have an aircraft surveillance system using Automatic Dependent Surveillance-Broadcast (ADS-B) to monitor all flights crossing Papua's airspace.

1.3. Research Purposes

Based on the formulation of the problem that has been described, the purpose of this study is to test and evaluate the availability of receivers for aircraft surveillance systems that use the Automatic Dependent Surveillance-Broadcast (ADS-B) system on flights in Papua airspace to provide and commemorate and support aviation safety. to be able to provide reliable global flight surveillance services with minimal deficiencies or errors for aircraft surveillance in Papua airspace.

1.4. Scope and Delimitation

In this study, the author provided some limitations so that they were not too broad so that the research was not focused and conceptualized and did not burden the author in conducting research. In this study, the author analyzed the availability and coverage of aircraft surveillance systems using the Automatic Dependent Surveillance – Broadcast (ADS-B) system on flights in Papua airspace using flight data recorded by the global Aircraft Surveillance system from the ADS-B system.

1.5. Hipothesis

There is no Automatic Dependent Surveillance-Broadcast (ADS-B) receiving system at 20 airports out of 22 airports in Papua to monitor all flights passing through Papuan airspace.

1.6. Research Method

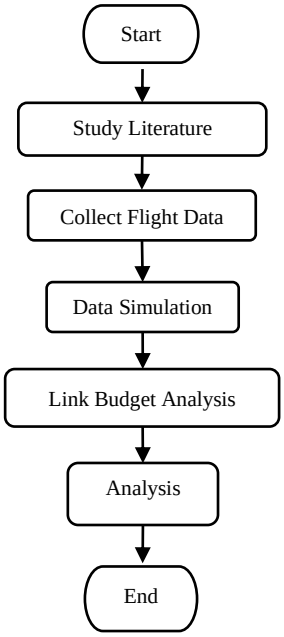

Figure 1. 2 Metodologi Flow Chart.

The methods used to complete this Final Project are:

1. Study Literature

   This is done by reading the existing literature, both from manuals and from other sources such as research journals. This step is done with the purpose of gaining insight so that become the subject of discussion.

2. Collect Flight Data

   Collecting flight data according to the scope studied by the author with different aircraft types, different routes and 5 same flight routes every day, All data is attached to the attachment section.

3. Data Simulation

   The flight data that has been obtained is carried out in a simulation to read deficiencies and map data problems. The data is simulated using MATLAB software and Google Earth Pro software.

4. Link Budget Analysis

   To find out the signal strength of the ADS-B system and an overview of the maximum coverage area of the ADS-B system.

5. Analysis

   Analysis is needed for the best possible assessment in solving the problem that starts with an assumption about its truth in order to create a solution to the problem.

1.7. Thesis Structure

The remainder of this thesis is structured as follows:

- CHAPTER I INTRODUCTION

  This chapter contains an introduction that explains the background, problem formulation, objectives, limitations of the problem, research methodology, and writing systematics.

- CHAPTER II STUDY OF LITERATURE

  This chapter contains the theoretical basis as a reference parameter for the implementation of this research.

- CHAPTER III RESEARCH METHODOLOGY

  This chapter explains the stages of Analyzes and the framework of research concepts used for system modelling. With this research methodology, it is hoped that it can provide instructions in formulating research problems.

- CHAPTER IV DATA ANALYSIS

This chapter contains the steps of simulation and testingperformed, test results and analysis of the test results obtained.

- CHAPTER V CONCLUSIONS AND SUGGESTIONS

This chapter contains the conclusions of the system created and suggestions for other purposes.