

ABSTRACT

Aviation safety is a paramount concern, becoming increasingly critical as air traffic volume surges. Traditional air traffic surveillance technologies, such as radar, have limitations in range and accuracy, particularly in remote areas or over vast oceanic expanses. As a solution, Automatic Dependent Surveillance-Broadcast (ADS-B) technology has emerged as a more precise satellite-based surveillance system. However, ADS-B systems can be costly and time-consuming to procure and develop. Hence, a system is needed to reduce operational costs and expedite implementation.

This research aims to design and build an ADS-B system, focusing on a 4-way power divider design using the Wilkinson method. This system will connect four array antennas, which will be integrated into the ground station to receive data from the airplane transponder.

The power divider design process involves defining specifications, calculating dimensions, and simulating the first-to-second power divider design using CST Studio 2019. The design is then optimized to meet the specified criteria. The design of power dividers 4-way is carried out without recalculation due to their similar structure, and the results are validated through simulation. A physical prototype is subsequently created and tested using a Lite Vector Network Analyzer (Lite VNA) to ensure performance adherence to specifications. The test results are compared with the simulation, and evaluations are conducted to identify any discrepancies. The project concludes with a summary of the design, fabrication, and measurement results, along with recommendations for future development.

Keywords: *Flight safety, ADS-B, Wilkinson power divider, Microstrip power divider*