ABSTRACT

The advancement of technology has made communication systems an essential part of human life, particularly in the rapidly evolving field of wireless communication. The demand for high-speed communication systems with optimal quality continues to increase. This research proposes a simple antenna system operating at a frequency of 5.8 GHz, designed with a compact size and tested on two different substrate materials during simulation. The use of a Butler matrix enables WiFi networks to achieve broader coverage, faster speeds, and greater stability.

This study designs and implements an antenna using a 2×2 Butler matrix with a triangular patch, developed on FR-4 material. The 2×2 Butler matrix is connected to an antenna capable of intelligently focusing WiFi signals on connected devices, thereby improving transmission efficiency compared to broadcasting signals in all directions. The designed antenna is based on a triangular patch structure and operates at 5.8 GHz. The antenna design and simulation were carried out using CST Studio, with simulation results showing that the designed Butler matrix achieved a return loss of -15.46 dB (S11) and -14.07 dB (S22), a gain of 5.95 dB, and a compact total dimension of 75×75 mm. With its optimal performance, this research contributes to the development of high-speed and efficient wireless communication systems.

Keywords: *Triangular* Microstrip Antena, *Butler Matrix*, Return Loss, *Bandwidth* , Gain.