ABSTRACT

Nowadays the development of wireless mobile communications technology is getting faster and supported by the development of intelligent antenna or what is often called the Smart Antenna. Smart Antenna is a system that is a combination type antenna array is equipped with signal processing capability which can optimize the radiation pattern or patterns that will be the recipient automatically responded by a signal in the vicinity.

In this final project are designed, implemented, and conducted measurements on Compact Butler Matrix at a frequency of 2.4GHz-2.5GHz. There are two designs that made the Compact Butler Matrix 4x4 and Conventional Butler Matrix 4x4. Components of Compact Butler Matrix 4x4 consists of four Hybrid 90^0, two Phase Shifter 45^0, and two Phase Shifter 360^0. components of Conventional Butler Matrix 4x4 consists of four Hybrid 90^0, two Crossover, Phase Shifter 45^0, and Phase Shifter 360^0. After getting the size of the element, then performed simulations using Ansoft HFSS 12. Elements are made using FR4 microstrip with type substrate with a thickness of 1.6 mm.

Realization of the design Compact Butler Matrix 4x4 has a size 15.7 cm x 8.4 cm and the large bandwidth of 200MHz to 2.4GHz-2.6GHz. While at Conventional Butler Matrix 4x4 design has a 17cm x 13cm and the large bandwidth of 85MHz at a frequency of 2.46GHz-2.545GHz. Phase error of Compact Butler Matrix 4x4 at each input port, respectively 11.18156^0, 12.52597^0, 9.76114351^0, 6.6411^0. While the phase error Conventional Butler Matrix 4x4 on each input port, respectively 13.9951008^0, 12.57793^0, 15.02644^0, 11.23382867^0. In both designs, the parameters of return loss and isolation between ports already meet the specifications of the magnitude ≤-10dB. But for the insertion loss is still there value ≤-10dB. One cause of inappropriate insertion loss value is a measure of the Butler Matrix. If the size of dimensions increases, losses in the stripline channel becomes large.

Kata Kunci: *Hybrid 90^0, Crossover, Phase Shifter 45^0, Phase Shifter 360^0, Butler Matrix, Beamforming, Smart Antenna, Bandwidth*