ABSTRACT

The development of wireless communication technologies with various services today, require an increase in the quality and capacity of wireless communication systems that already exist. Increasing the number of base stations or additional bandwidth is still a practical solution for operators to overcome these problems though this will cost expensive and the installation process is relatively long and complicated. Smart antenna system is a solution that is much more efficient than previous solutions. The elements of antenna system in switched beam antenna system are antenna array used Butler Matrix.

This Final Project will be designed, realized, and will be done measurement of Butler Matrix at 2,4 GHz frequency. Butler Matrix that will be designed, has two kind of phase shifter, those are 30^0 and 60^0 phase shifter. Those dual phase shifter has been realized using ideal switch as PIN diode. The Design processes will be done on three steps, those are patch antenna design, butler matrix design, and antenna system design which is the integration of antena patch array and butler matrix. In design processes, will be done calculation of all that elements size, and will be simulated using Ansoft HFSS 12. Then, the antenna system will be realized use microstrip methode with FR4 substrate and 1,6 mm thickness.

This antenna system, which consist of antenna patch array and butler matrix, has fulfilled almost all the spesification that have been determined. The spesifications of patch antenna are to operates at 2,4 GHz frequency, VSWR ≤1,5, return loss, and isolation ≤-10 dB. And the spesifications of butler matrix are to work at 2,4 GHz frequency, VSWR≤1,5, return loss and isolation ≤-10 dB, phase error ≤ 20^0, and insertion loss ≥ -10dB. Beside that, by adding dual phase shifter, this antenna system is able to generates beam to different direction, they are -45^o, -40^o, -20^o, -5^o, 5^o, 20^o, 40^o, 45^o

Keyword: Beamforming, Butler Matrix, Microstrip, antena patch array, switched beam, dual phase shifter, PIN diode