

## **ABSTRACT**

*In the 5G era, small cells will be used to deploy various wireless services in one small coverage area. To support this infrastructure, multiband antennas are needed, so the device maintenance is more efficient and economical. Microstrip antenna is a type of antenna which is usually developed because of the characteristics of microstrip that have a small physical form and easily fabricated. By integrating certain techniques on the microstrip, the antenna can switch functions into a multiband antenna.*

*This Final Project is designed and realized a rectangular slotted patch multiband microstrip antenna that works at 1.8 GHz, 2.1 GHz, 2.4 GHz, and 3.5 GHz in one device. The design was done with CST Studio Suite 2017 then the prototype was design based on previous research that related to multiband microstrip antennas, but there was modification with the addition of slots on patch element. The parameters were achieved are return loss  $\leq -10$  dB, VSWR  $\leq 2$ , bandwidth  $\leq 100$  MHz for 2.4 GHz and  $\geq 100$  MHz for 1.8 GHz, 2.1 GHz, and 3.5 GHz. Gain  $> 1$  dBi, omnidirectional radiation pattern and elliptical type polarization. The material was used for the substrate is FR-4 epoxy with a relative permittivity of 4.6 and a thickness of 1.6 mm.*

*The measurement results show the antenna works on 1.8 GHz, 2.1 GHz, 2.4 GHz, and 3.5 GHz, return loss -13.874 dB, -17.527 dB, -15.462 dB, and -22.720 dB. VSWR 1.508, 1.307, 1.411, and 1.157. Bandwidth of each frequency 585 MHz, 206 MHz, 55 MHz, 837 MHz. Impedance at 34.158  $\Omega$ , 55.636  $\Omega$ , 36.378  $\Omega$ , and 51.027  $\Omega$ . Gain 1.35 dBi, 1.51 dBi, 2.26 dBi, 2.33 dBi with bidirectional radiation patterns and elliptical polarization. The antenna works by elliptical polarization at 2.1 GHz and 3.5 and circular polarization at 1.8 GHz and 2.4 GHz. Based on the results, some parameters had reached the specifications for small cell applications . The antenna has bidirectional radiation pattern, so it's suitable as a repeater for area with bi-directional coverage.*

**Keywords: Small Cell, Microstrip Antena, Multiband, Slotted Rectangular Patch, Sub-6 GHz**