ABSTRACT

5G technology is a continuation of 4G technology with speeds that can be 10x faster, that is, it can reach 1 Gbps. 5G technology has a faster data transmission speed, so components that can implement 5G technology are needed, namely microstrip antennas. A microstrip antenna is a metal conductor attached to the ground plane which includes dielectric material [1]. The disadvantage of microstrip antennas is that they have low bandwidth and gain, so this final project focuses on increasing bandwidth and gain using the Left-Handed Metamaterial (LHM) method which is placed in front of the antenna.

This final project carries out the realization and design of a hexagonal patch microstrip antenna at a frequency of 3.5 GHz with the addition of a Left - Handed Metamaterial (LHM) structure, namely the Split Ring Resonator (SRR) which is placed in front of the antenna by adding the Superstrate method. By adding a Split Ring Resonator (SRR) structure it can produce negative permittivity (ε) and permeability (μ) values or sometimes called Double Negative Material (DNG). The addition of the superstrate method can increase the bandwidth and gain of the antenna. The substrate used is FR-4 material with a relative dielectric constant of 4.3, a loss tangent of 0.025 and a substrate thickness of 1.6 mm.

The simulation results of antenna design using the 3x3 superstrate method are proven to increase bandwidth and gain. Gain increase from -0.9 dBi to 3.81 dBi and bandwidth to 205 MHz from 85 MHz. The results of antenna measurements at a gain value of 3.31 dBi and a bandwidth of 199 MHz with a radiation pattern that is in accordance with the specifications, namely unidirectional.

***Keywords** : 5G, hexagonal microstrip patch antenna, Split Ring Resonator (SRR)*