

## ABSTRACT

*In the development of 5G technology, the presence of microstrip antenna plays a big role, because of its physical characteristics which are small, thin, light. But its have disadvantages, such as narrow bandwidth, small gain and large dimensions. But the most serious problem is how small bandwidth they produced. So, many researches are done to make microstrip antennas have wide bandwidth. In this final project, we will discuss the increase in the bandwidth of the microstrip antenna using metamaterials. One method that uses metamaterials is the Artificial Ground Structure (AGS) method which acts as a ground plane antenna.*

*In this final project, designing, simulating and analyzing a microstrip antenna with a rectangular patch at a frequency of 3.5 GHz based on metamaterial. The design uses CST Studio Suite 2018, for the substrate using FR-4 with a relative permittivity of 4.3 and a thickness of 1.6 mm. The desired result of the antenna has a return loss below -10 dB, VSWR less than 2, and gain greater than 2 dBi with an omnidirectional radiation pattern.*

*When simulating the antenna without AGS, the antenna working at frequency of 3.5 GHz has a return loss -36.38 dB and VSWR 1.03 and bandwidth of 172.3 MHz. While the antenna with AGS, at frequency of 3.5 GHz, antenna has return loss -35.106 dB, bandwidth of 1.89 GHz, and VSWR 1.03. With the AGS method, the bandwidth increase is 90.88%.*

**Keyword: microstrip antenna, metamaterial, AGS, 5G.**