ABSTRACT

Advances in technology, especially in the field of telecommunications is developing very rapidly. The speed of sending and receiving data is a priority requirement in the rapidly growing telecommunication sector. Fifth generation technology (5G) requires components that can work properly to meet the needs of sending and receiving data. The antenna is one of the components needed in the fifth generation (5G) implementation.

In this Final Project, the design and realization of a microstrip antenna is carried out using the metamaterial concept that works at a frequency of 3.5 GHz. Electromagnetic Band Gap (EBG) is an example of a metamaterial that has an important function for increasing antenna parameters. The use of Electromagnetic Band Gap (EBG) can improve the quality of the antenna and maximize the dimensions of the antenna.

In this Final Project, parameter improvement is the main goal. Tests will be carried out with an antenna without an EBG structure and an antenna with an EBG structure at a working frequency of 3.5 GHz (5G Band) with a gap of 5 mm. In the antenna simulation with the EBG structure, the gain value increases. The gain value on the antenna calculation reaches 2.376 dBi and reaches 2.653 dBi during optimization, and increases to 4.229 dBi on the antenna with EBG structure. There is also a change in the shape of the radiation pattern on the antenna with the EBG structure where the shape of the polarization means that there is a perfect reflection caused by the EBG structure which is the reflector. Also, changes in the radiation pattern result in the disappearance of the back lobe that is present in conventional antennas.

Keywords: *fifth generation*, antenna, *microstrip*, EBG