

## ABSTRACT

The development of technology communication system is increasing every year triggers the increasing high demand of speed internet access. The technology that can provide internet services at high speed and cover all the areas, namely 5G technology(fifth generation). 5G technology has the advantages such as high data rate, wide bandwidth, reducing latency, increasing channel capacity and more energy efficient. The antenna used in 5G technology using the MIMO system(Multiple Input Multiple Output). A MIMO system that serves to reduce reflection and scattering of the wave as well as useful to raise the channel capacity by using more than one antenna at the receiver and the transmitter.

In this thes the research done by designing the antenna massive MIMO at the transmitter side with the arrangement of the  $2 \times 8$  16 elements using a frequency of 3.5 GHz. The shape of the patch that is selected is the shape circular . The material chosen for the substrate layer that is FR-4 with dielectric permittivity 4.3 and thickness of 1.6 mm and the material for the layer groundplane, the patch and the feedline, i.e. copper (copper). Feeding techniques used ration microstrip line.The methods used in the design of the antenna between the other multi-substrate 3 of the layer to improve the bandwidth and the reflector to increase the gain.

Based on the simulation of the MIMO transmitter antenna design using the software, it obtain a bandwidth value from 143.2 MHz (3,4253-3,5685 GHz) to 154.2 MHz (3,4264-3,5806 GHz), with a minimum gain value of 6,519 dBi. and maximum gain of 7,148 dBi, unidirectional radiation pattern of each antenna element and mutual coupling value of -20.29 dB and smallest -67.11 dB.

**Keyword :** Antenna, *MIMO*, 5G, *Gain*, *Bandwidth*, *Mutual Coupling*