

ABSTRACT

The increasing number of smartphone users certainly requires a communication system that is higher quality, larger in capacity, efficient, and faster than before. One technology that can solve these problems is 5G. 5G offers greater efficiency and data capacity, has a high bandwidth with data transfer speeds of up to 1 Gbps, and has lower power consumption. The Massive MIMO antenna system, which uses many antennas to speed up data transfer and expand capacity, is one of the supporters of 5G technology. This concept can be understood through Shanon's Capacity Equation, which explains that the number of receiver and transmitter elements affects the amount of network capacity.

The focus of this final project is to design an 64 elemen Massive MIMO antenna with an ellipse patch shape operating at 3.5 GHz, the working frequency for 5G communication. The determination of the antenna specifications to be designed is based on a literature study of the antenna requirements for 5G communication, where there is a minimum bandwidth of 10 MHz, the minimum value of gain is 5 dBi, the return loss value must be smaller than -10 dB, and the VSWR value must be smaller than 2 as a feasibility condition for the antenna to operate properly. Then, after determining the antenna specifications, proceed with the design of the single element antenna, and optimize it as best as possible so that it can be a good enough reference antenna to be used as a reference for the 64-element Massive MIMO antenna for enhanced Mobile Broadband (eMBB) services.

Based on the simulation results of the Massive MIMO antenna design, the highest mutual coupling value is obtained at -20.035 dB and the lowest mutual coupling value is -68.175 dB, a gain value of 13.60 dBi, directional polarization, and the bandwidth value of Massive MIMO antenna is 102,859 MHz. The number of simulations performed was 7 times, which is single-element antenna, 2 elements antenna, 4 elements antenna, 8 elements antenna, 16 elements antenna, 32 elements antenna, 64 elements antenna.

Keywords: ellipse-patched microstrip antenna, 64-element Massive MIMO, 5G.