ABSTRACT

The development of technology in the digital era is very fast and has brought various changes in society. One of the rapidly growing fields of technology is in the field of telecommunications. 5G technology is in the spotlight because it has a faster data transmission speed than 4G technology. 5G technology provides much better transmission speeds, but to support indoor implementation, communication components that have compact properties are needed. However, the gain value on the microstrip antenna is very small on the antenna that works with a frequency of 3.5 Ghz, so a method must be used to increase the gain on the microstrip antenna.

In this research, we propose the addition of metamaterials as metasurfaces to improve antenna performance and increase antenna gain. By implementing metamaterials and metasurfaces on the feed line, patch line and acting as a superstrate, it is hoped that there will be an increase in bandwidth and gain. The design to be designed consists of a microstrip antenna and two metasurface layers above it. The proposed antenna design is expected to have a gain greater than or equal to 5 dB and a bandwidth wider than 100 MHz. The metamaterial structure on the metasurface is the unit cell Square Split Ring Resonator (SSRR).

The results of this antenna design are proven to be able to increase the gain to be achieved because the metasurface functions as a lens to focus the radiation beam which causes the beam width of the antenna to narrow after adding 1 metasurface antenna. The design performance results obtained a VSWR value of 1.44, return loss -14.75 dB with a bandwidth of 200 MHz and a gain value of 6.011 dBi. Meanwhile, when added with the radome, the VSWR value was 1.49, the return loss was -13.98 dB and the gain value was 5.614 dBi.

Keywords: Antenna, Metamaterial, Metasurface, SSRR, Gain