

## ABSTRACT

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*In this era, telecommunications technology is growing and has reached the Fifth Generation (5G). However, in the midst of data usage needs, many regions are still faced with limited network infrastructure that has not been able to support the surge in demand, there are obstacles in increasing network capacity due to limited resources and budgets as well as limited frequency spectrum. The need for wide bandwidth is required therefore an antenna using Rectangular Split Ring Resonator (RSRR) is proposed to obtain wide bandwidth. In this case the RSRR unit cell needs to be studied further to obtain wide bandwidth and high gain. In design, a microstrip antenna is a suitable candidate due to its compact and less bulky nature. Since the basic antenna to be used is microstrip, the RSRR antenna can be realized to cover small areas such as rooms or small meeting rooms that require internet data services. The antenna to be designed has a dual layer model consisting of two layers of components, namely a microstrip antenna and a metasurface integrated using nylon spacers. Each layer of this antenna has dimensions  $(35.68 \times 31.05 \times 11.60)$  mm with a gain of 5.12 dB with azimuth  $100^\circ$ , elevation  $80^\circ$ , return loss -20.63 dB (at 3.5 GHz) and bandwidth 363.70 MHz. This RSRR model antenna has a small size with a thin dielectric array consisting of  $2 \times 2$  RSRR metasurfaces and has high gain capability and wide bandwidth with good radiation.*

**Keywords:** *Metasurface, unit cell, RSSR, gain, bandwidth.*