

ABSTRACT

Wireless Networks have become a primary necessity in various sectors of life, ranging from education and industry to households. One of the most commonly used wireless technologies is WiFi (Wireless Fidelity), which allows devices to connect to the internet without using physical cables. This technology offers high flexibility and easy access to information, but it also presents new challenges, such as the risk of data leaks and electromagnetic interference between devices. To address this issue, a solution is needed that can selectively limit or even block WiFi signals without affecting other systems nearby. One potential solution is the use of metamaterial absorbers. These metamaterials are designed to absorb electromagnetic waves at a frequency of 2.4 GHz, which is commonly used in WiFi Networks. The structure was designed using 12×12 unit cells in a 30×30 cm periodic area and simulated using CST Studio Suite to obtain an S11 value of < -10 dB. The prototype was fabricated using $35 \mu\text{m}$ thick copper-clad FR-4 substrate. Performance measurements using a Vector Network Analyzer (VNA) and Spectrum Analyzer (SA) show an S11 value of -10.72 dB with an absorption rate of 90%. The power level of the WiFi signal decreases to -86.1 dBm, indicating the effectiveness of the structure in attenuating the signal at 2.4 GHz.

Keywords: CST Studio, Electromagnetic Wave, Metamaterial Absorber, S-Parameter, WiFi.