IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 1, August 2024

Design and Simulation of 1x4 Patch Array for Enhanced Gain

Anusha Shetty[1], Chaithra[2], Abhishek V Rao[3], Prajwal[4], Dr. Sruthi Dinesh[5]
UG Students, Department of Electronics and Communication Engineering[1-4]
Assistant Professor, Department of Electronics and Communication Engineering[5]
Mangalore Institute of Technology & Engineering, Mangalore, India

Abstract: *In contemporary wireless communication systems, antenna design plays a crucial role in achieving better performance metrics like gain, directivity, radiation efficiency, and appropriate impedance matching. In this work, a 1x4 array antenna operating at 2.4 GHz is designed and simulated. With an emphasis on single patch antennas and linear arrays with 1x2 and 1x4 components, beam steering in antenna array investigates the design, simulation, and analysis of antenna arrays at 2.4 GHz using CST Microwave Studio. In order to maximize performance, the project starts with the design of a single patch antenna. Important factors such as substrate material, patch dimensions, and feed mechanisms are examined. To improve gain, directivity, and bandwidth, 1x2 and 1x4 linear arrays are designed as an extension of the single patch design. The antennas are simulated using CST Microwave Studio, which offers comprehensive insights into their radiation patterns, impedance matching, and overall performance. Based on the simulations, it can be observed that a 1x4 array has substantially better gain and directivity when compared to a single patch. As a result, these arrays are more appropriate for applications that need more concentrated beams and greater coverage. Performance comparisons between the single patch, 1x2, and 1x4 arrays are included in the project's thorough study, along with a discussion of the trade-offs between design complexity, physical size, and performance advantages. The findings demonstrate the advantages of antenna arrays in improving 2.4 GHz wireless communication systems and provide insightful guidance for the creation of effective and high-performing antennas in this frequency range. The suggested antenna array exhibits encouraging performance in terms of parameters like gain, directivity, and efficiency, which qualifies it for use in particular applications including Internet of Things (IoT), wireless communication systems, and radar systems.*

Keywords: Patch Antenna, CST, gain, directivity, return loss

DOI: 10.48175/IJARSCT-19306