



# Chapter 7

## Multi-Band Rectangular Zig-Zag-Shaped Microstrip Patch Antenna for Wireless Applications

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### ABSTRACT

*In the era of fifth generation communication system, multi-band patch antenna is the key element of this system. Most of the wireless communication devices work in the range of 1 to 6 GHz such as wireless fidelity (Wi-Fi), Wi-Max, and wireless local area network. In this research work, a modified zig-zag-shaped multiband patch antenna with cross-cut set that covers 1 to 6 GHz range is designed. Proposed patch antenna shows five different bands at*

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*different resonant frequencies 1.4, 2.3, 2.5, 3.42, and 4.16 all in GHz. The proposed zig-zag-shaped patch antenna also calculates the radiation pattern and specific absorption rate (SAR).*

## **INTRODUCTION**

In this paper the knowledge of the wireless communication, the conventional Microstrip patch antenna, dielectric resonator antenna and the introduction of new advanced technology that is electromagnetic band gap structures are defined. The crucial component of a wireless network is the 'Antenna' so without appropriate design of the antenna, the signal produced by the RF system will not be transmitted properly and not any proper interfered signal can be detected at the receiver end (Luk, 2003 & Yang and Rahmat-Samji, 2003 & Khalily et. al, 2014 & Mu'ath, Denidni, and Sebak, 2012). Various types of antenna have been made to provide various applications and suitable for particular requirements.

The microstrip antenna has been considered to be the most ingenious field in the engineering of antenna having the properties like low material cost and the easy simulation. So the frequency range is also increased slightly in the some millimeter region (approx 100-300 GHz) that can be utilized (Al-Hasan, Denidni, and Sebak 2012 & Yadav and Singh, 2019 & Bhardwaj and Kumar, 2012 & Ryu and Kishk, 2010 & Coulibaly and Denidni, 2009). The conduction losses in metallic antennas have expanded to a level that affects the relevant operation of the systems. So an idea to use dielectric material as a radiator was perceived. These antennas are used in space applications, government and commercial applications. They include radiating patch of metallic material on substrate with ground structure on its back (Ge and Esselle, 2009 & Aras et al, 2008 & El-Deen et al, 2006).

This paper covered the basic principle of the design of dielectric resonator antenna with the help of mushroom-like electromagnetic band gap structure. The design and simulation of triple-band rectangular zigzag micro-strip patch antenna having Defected Ground Structure (DGS) for improved bandwidth for WLAN AND DBS applications. The fabrication and testing of Triple-Band Rectangular Zigzag microstrip patch antenna has been done (Li and Sun, 2005 & Mittal, Khanna, and Kaur, 2015 & Singh, Dhupkariva, and Bangari, 2017 & Kaur, Khanna, and Kartikeyan, 2014). In this micro-strip patch antenna, slotting and different feeding technique is also used to enhance the gain.

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