

## Stub-Based Higher Order Harmonics Suppression for Upper W-LAN Band Microstrip Patch Antenna

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### ABSTRACT

In this paper, the authors investigate the elimination of higher order harmonics in a microstrip patch antenna operating in higher bands for wireless local area networks (WLAN). The goal will be the subsequent suppression of harmonics without further complication of the design by either introducing additional structures or filters, while the stub is included in the design. The report presents the methodology employed, which involves designing and simulating a microstrip patch antenna with stubs strategically placed at specific locations. The outcomes show how successful the suggested technique in reducing the higher-order harmonics, leading to improved antenna performance. The findings highlight the importance of stub placement and dimensions in achieving desired harmonic suppression. Based on the results, recommendations are provided for optimizing stub configurations to further enhance the elimination of higher-order harmonics in microstrip patch antennas operating in W-LAN higher bands. This research advances the creation of compact and efficient antenna designs for modern wireless communication systems.

**Keyword:** *Microstrip patch antenna, Higher-order harmonics, Stub placement, Harmonic suppression, Wireless local area network (WLAN)*

### 1. INTRODUCTION

Microstrip patch antennas are widely used in wireless communication systems, such as WLAN, due to their small size, flat profile, and easy integration. However, they can produce higher-order harmonics, which can lead to interference, signal deterioration, and non-compliance with regulations. These antennas are made up of a conductive patch on a dielectric substrate with a ground plane and are utilized in mobile phones, satellite communication, Wi-Fi networks, and radar systems<sup>[8,9]</sup>. In WLAN systems that operate at higher frequencies, dealing with higher-order harmonics poses significant challenges. Conventional methods for suppressing harmonics involve intricate structures or additional components, which can increase the size and cost of the antenna system<sup>[1, 3, 4]</sup>.

This study explores the use of strategically placed stubs within the antenna design to eliminate higher-order harmonics in microstrip patch antennas operating in the higher band of WLAN. The aim is to investigate the feasibility and effectiveness of using stubs for harmonic suppression-only. This is done through the design and simulation of microstrip patch antenna