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Dual Band Multi Frequency Rectangular Patch Microstrip Antenna with Flyswatter Shaped Slot for Wireless Systems

Dheeraj Bhardwaj[1,a], Shriti Saraswat[2,b], Gitansh Gulati[3,c], Snehanshu Shekhar[4,e], Kanika Joshi[5,d] and Komal Sharma[6,f]

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Abstract. In this paper a dual band planar antenna has been proposed for IEEE 802.16 Wi-MAX /IEEE 802.11 WLAN/ 4.9 GHz public safety applications. The antenna comprises a frequency bandwidth of 560MHz (3.37GHz-3.93GHz) for WLAN and WiMAX and 372MHz (4.82GHz-5.192GHz) for 4.9 GHz public safety applications and Radio astronomy services (4.8-4.94 GHz). The proposed antenna constitutes of a single microstrip patch reactively loaded with three identical steps positioned in a zig-zag manner towards the radiating edges of the patch. The coaxially fed patch antenna characteristics (radiation pattern, antenna gain, antenna directivity, current distribution, S_{11}) have been investigated. The antenna design is primarily focused on achieving a dual band operation.

INTRODUCTION

Wireless technology has been advancing for the last two decades, with the advent of fourth generation communication technology. WiMAX(Wireless Interoperability for Microwave Access) has gained considerable importance in numerous applications such as broadband services (Voice over IP), wireless backhauling, wireless mesh networks with improved quality of service. It has been the central topic to solve the problem of unsatisfied infrastructure for wired services in remote areas where the large coverage area is needed.

Microstrip patch antennas also known as low-profile printed circuit antennas due to its low cost, planar structure, conformability, lightweight and compact-size have been widely used in the present-day wireless communication systems. In the emerging applications such as WLAN, WiMAX, GSM, vehicular-satellite systems, synthetic aperture radar (SAR) etc. , in which increased bandwidth is needed for operating at two separate sub-bands, a valid alternative to the broadening of total bandwidth is the use of dual-band resonating patch antennas covering a considerable amount of bandwidth in each application specific band. When the system requires operation at two different frequencies, dual-band patch antenna may avoid the use of two different antennas; thus adding freedom to design.

Apart from the bandwidth, the two major areas of concern while designing dual-band patch antenna are the radiation performance and gain-bandwidth product which plays a crucial role in overall deployment of antenna for