Design of Planar Inverted-F Antenna (PIFA) for WiMAX/RAS Application

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***Abstract*-- This paper deals with slim Planar Inverted-F Antenna (PIFA)Working in the WiMAX (Worldwide Interoperability for Microwave Access) band (3300 to 3800 GHz), MFMC (Military Fixed and Mobile Application) band (4400 to 4500 GHz) and RAS (Radio Astronomy service) band(4800 to 4940 GHz) is presented. The antenna is designed to be integrated in portable devices and meets strict space requirements. The final design fits a volume of 100 × 24 × 9.7 mm^3(L × W × H). It is composed of a series of branches, properly dimensioned and separated to generate the resonances at the desired frequencies. The linearly polarized antenna exhibits good impedance matching performance, wide beam radiation pattern, and relatively high gain.The main advantage of this PIFA is that can be hiding into the housing of the mobile when comparable to other antenna.**

***Index Terms*--Internal antenna, linear polarization, planarinverted-F antenna (PIFA), slim antenna.**

INTRODUCTION

The advancement of wireless communication prompts an awesome interest of growing demand of multiband antenna that can be effortlessly incorporated inside of the space accessible inside the harm, minimum in size in the appearance point of view. Customary microstrip reception apparatus outlines depend on half-wavelength of operation, while the Planar Inverted-F Antenna plans conjure the quarter-wavelength operation. The quarter wavelength of PIFA operation is because of the association of the emanating component to the ground plane through a shorting strip or stick. Therefore planar modified F radio wire (PIFA) is a promising structure to meet these prerequisites of convenient gadgets [1].

Multiband operation can be accomplished by making openings in the emanating component or putting reverberating strips in the antenna structure. Impedance coordinating at various recurrence groups is normally enhanced by utilizing parasitic components and receptive stacking at fitting areas in the recieving antenna structure [2].

Current convenient gadgets incorporate web access through cabled or remote neighborhood (LANs). A legitimate option answer for web access can be spoken to by an association through WiMAX based administrations. WiMAX, otherwise called IEEE 802.16, is an IP based, remote broadband access innovation that gives execution like 802.11/Wi-Fi systems with the scope and QoS (nature of administration) of cellular network. With WiMAX, Wi-Fi like information rates can be effortlessly accomplished, however the issue of obstruction is diminished. WiMAX works on both authorized and unlicensed frequencies, giving a controlled situation and practical financial model for remote bearers. Not with standing this, RAS gives 4.8-4.99 GHz range is allotted worldwide to the RAS on an optional premise, with essential designations to RAS in a few nations. The 4.5-5.15 GHz range is one of numerous limited groups in which FCC Part 15 rules license unlicensed gadgets to emanate just low level outflows.

In this paper, the design of linearly polarized planar inverted F-antenna (PIFA) working in RAS band (4.8-4.94 GHz) and WiMAX band (3.3-3.8 GHz) is exhibited. The transmitting component shows a wide beam radiation pattern and, in the meantime, a generally high gain because of the low losses deriving from the absence of a dielectric layer under the emanating driven and parasitic plates. Suitable change is done in the ground plane by cutting the open finished space of 1 mm width to accomplish the required transfer speed [5], [6]. The geometry of the proposed PIFA is depicted in area II, while simulation results are exhibited in segment

ANTENNA CONFIGURATION

Fig. 1 demonstrates radio antenna setups of the proposed PIFA, which comprises of driven and parasitic components. The driven inverted F-shaped component made out of C-shaped patch and shorting strip. Though, the parasitic inverted-L component is a shorted rectangular patch. Both the components are adjusted eye to eye over a limited ground plane (Lg x Wg) with air as substrate.

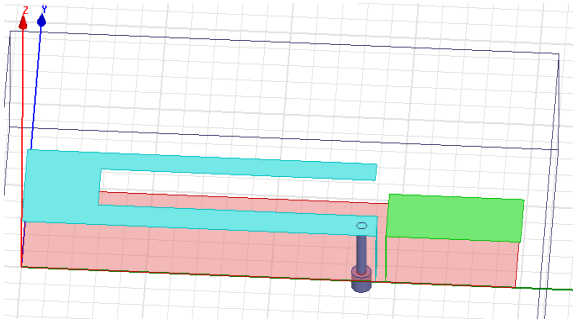


Fig1:3-D Layout Of Proposed PIFA

Fig2:Side View

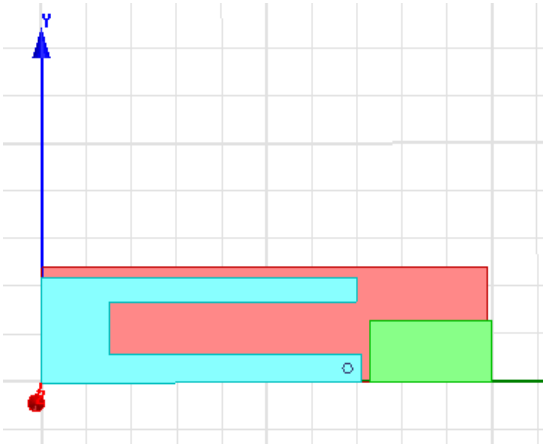


Fig3:Top View

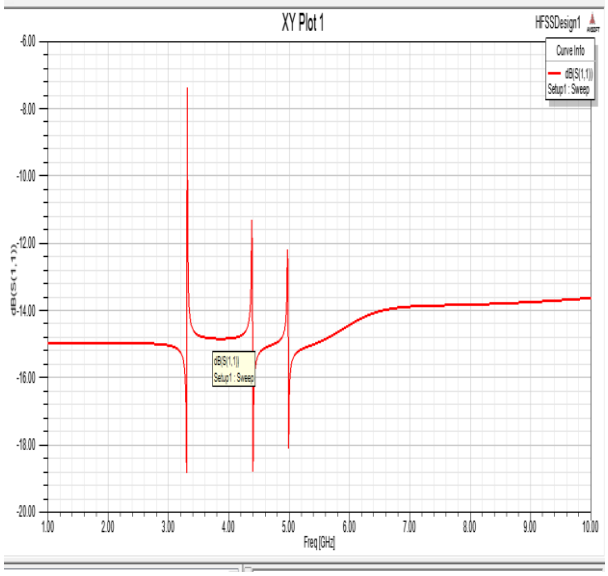
Fig.2 and Fig.3 demonstrate the side and the top perspectives of the recieving antenna. Ideal coupling in the middle of driven and parasitic components is accomplished at a dimension of 2 mm. The unraveled view with shape parameters of the proposed radio wire are appeared in Figures demonstrates the ground plane structure. The radio antenna has been composed utilizing the Ansoft HFSS programming [7] and the enhanced estimations of the shape parameters of the proposed recieving wire are given in Table I. It is significant.

ANTENNA DIMENSIONS

Antenna Parameter	Size, Mm	Antenna Parameter	Size, mm
L	100	W3	22
W	24	Ls1	9.5
H	9.7	Ws1	5
T	9.3	Ls2	9.5
S	1	Ws2	2.5
G1	2	Lp	27
G2	11	Wp	13
G3	2	Lg	99
L1	71	Wg	24
L2	70	X1	45
L3	15	X2	44
W1	6	Y	1
W2	5		

Table1

SIMULATED RESULT



Frequency vs Reflection coefficient

CONCLUSION

In this paper, a 3-D dual band planar inverted-F antenna is presented and studied. The proposed linearly polarized antenna exhibits good impedance matching performance and a relatively high gain in both RAS and WiMAX band. This antenna allows the reception from a wide angle towards the satellite constellation to work suitably in the RAS band as well as having wide beamwidth in the WiMAX band.

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