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Reconfigurable Fork ShapeMicrostrip Patch Antenna for Wireless Application

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Abstract: *The designed antenna is about a configurable fork shape microstrip patch antenna. The antenna design is based on reconfigurable frequency conditions. The antenna was tested and simulated, and the antenna gain was improved under different frequency conditions of 4 to 7 GHz. Slotted antennas are suitable for both single band and multiband frequencies. The antenna has a substrate based on the FR4 epoxy design. The parameters of power, gain and radiated directivity are modified. The work and tests are performed by the CST software. Antenna inspections and evaluation results are presented.*

Key Words: *Reconfigurable, Patch antenna, edge fed, Fork Shape, CST*

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I. Introduction

In recent years, antennas have played a very important role in the field of wireless communications. With the growth and increase of broadband technology, micro strip patch antennas are the most favored [1] [3]. It is widely used in satellite communications, aircraft, missiles, GPS systems, and broadcasting. Some of the antenna power amplifiers are low cost, low profile, small size and polarization [4] [6]. Basically, the expansion of dual-band antennas in wired antennas has been accomplished. The internal configuration of the handset antenna is obtained by organizing the size of the small antenna [6]. With the expansion of cellular communications, dual frequency input has a beneficial effect on the scene: relatively exquisite electrical aspects, compressed geometry, cheapness and sufficient functionality can create a single coaxial power supply [7] [8].

Similarly, reconfigurable antennas are important for wireless communications that are widely used in defense and marketing. Use a diode to reconfigure the antenna. [9] It is possible to modify the operating frequency, the radiation pattern and the real-time polarization [10] and, when the antenna is reconfigurable, the polarization includes straight linear and linear left polarizations [10]. The extreme hindrances of patch antenna bandwidth is restricted, gain is not high, little efficiency, lesser power and inadequate polarization. Therefore, in order to conquer theindicated numerous obstacles few resolutions have been recommended for instance slots, coaxial probe feeding techniques and diodes. [1-2]

In addition, another specific method is to consider the mode frequency and the model efficiency of the resonance characteristics of the hidden surface current wave. Due to the relevance of the applicability of the slotted patch antenna, the result of the fact that the category of the unintentional character sketch of the antenna has a larger capacity. We can also adjust the shape of the contrast in the form of slots of different width. Including the consideration of the diode positioning slot may favor the gain of the patch antenna, low dielectric constant and bandwidth. By controlling the slot, the patch antenna is affected. The diodes and capacitors of the patch antenna are represented correctly. [4] In the future, these conditions can meet the needs of the development of wireless technology.

II. Antenna Configuration

In this antenna, the size of the substrate at the -17.5, +17.5, 0 position is 35mm x 35mm x 1.6mm. The material used for the substrate is the FR4 epoxy resin. The square patch has been cut into fork shape by the slot, and between the opposite fork sides, the two square slots are cut out. Each cut out have a one PIN diode. That means there are four diode named switch1a, switch1b, switch2a and switch2b. The dimension of antenna is35x 35. Ground and top of the patch is made of copper. Metal thickness is 0.035 mm. substrate thickness is 1.57 mm. There are 2.8 mm microstrip line with 50 ohm resistance as shown in fig. 1.

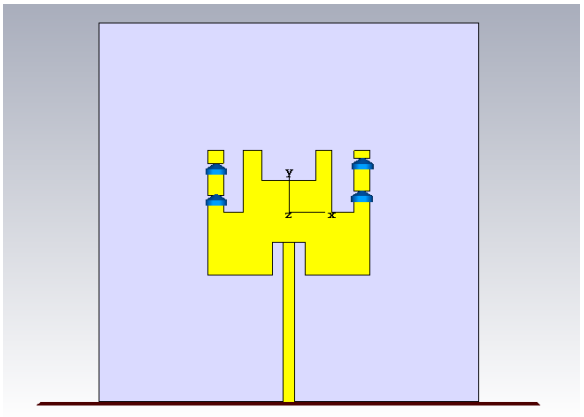

Fig 1. Top level antenna design

III. Result And Simulation

When all diodes are ON condition then S parameter as shown in fig. 2 and VSWR graphand Farfield directivity as shown in figure 3 and 4 respectively.

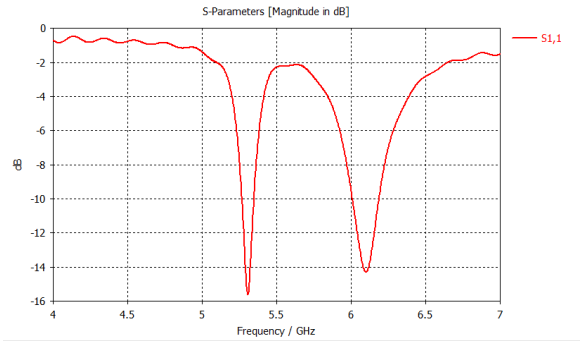

Fig 2. S parameter Vs frequency graph

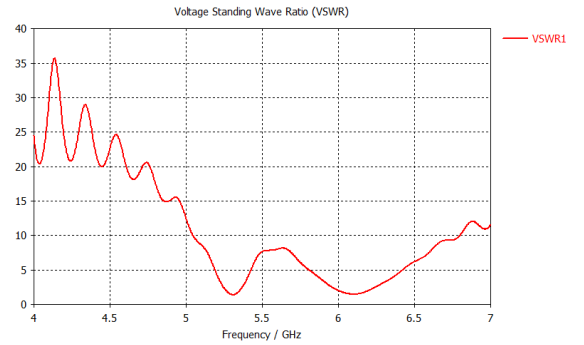

Fig 3 VSWR Vs Frequency

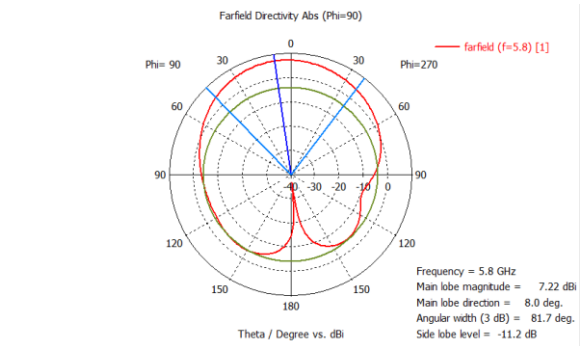

Fig 4 Farfield Directivity Abs polar graph

When two diodes switch1a and switch2a are ON but Switch1b and switch2b are OFF then S parameter as shown in fig 5.

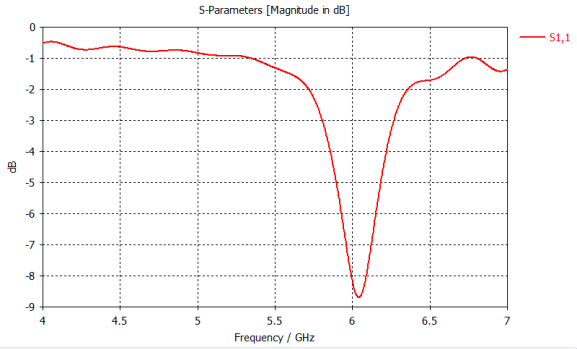

Fig 5.S parameter when upper two diodes ON

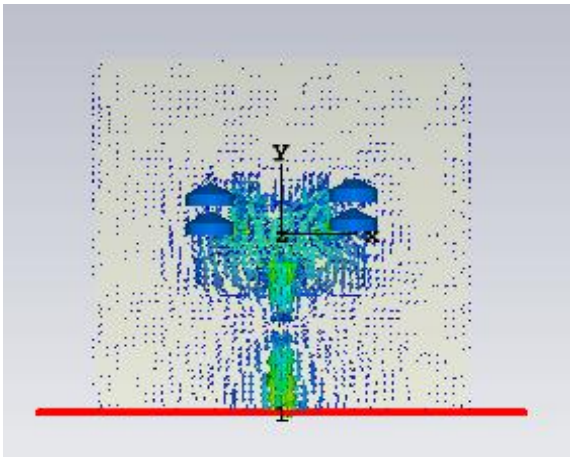

Fig 6. Surface current distribution

In fig. 6 shows the surface current distribution in antenna.

IV. Conclusions

In this paper, an analytical model for designing an edge fed reconfigurable rectangular slotted Microstrip patch antenna is proposed. The introduction of rectangular slots on radiating patch results in square slot shaped patch and it increases the current path. That is the effective length increases, which in turn increases the wavelength. As wavelength increases, frequency decreases. So there is a shift of resonant frequency towards left.

In this paper, simulation results of reconfigurable dual frequency fork-shaped microstrip patch antenna are presented and explained. Due to shortage of fabrication utilities; both simulation methods results are in agreement with the design principles. This reconfigurable multi-band new-shaped patch antenna can be applied to any desired frequency band used for mobile communication. The frequency of the reconfigurable antenna obtained in this paper covered 4 to 7 GHz with return loss less than -10dB, VSWR almost 1 at two frequencies 5.3 GHz and 6.1 GHz.

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Snehlata Verma " Reconfigurable Fork ShapeMicrostrip Patch Antenna for Wireless Application." IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) 13.3 (2018): 29-32.