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Pattern Reconfigurable Antenna Uses To Increase Radiation Frequency for Compact Device Applications

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ABSTRACT: *In this paper, Pattern Reconfigurable Antenna uses to Increase Radiation Frequency for Compact Device Applications proposed. The proposed antenna includes of an incitement component, four parasitic components and eight radio frequency switches. The analysis results show that the proposed antenna can operate at 0.83-0.93GHz and 1.65-1.90GHz for compact device applications. The frequency and the pattern reconfigurable characteristics are accomplished by controlling the radio switches connected on the incitement component and the parasitic components. The simulation results established that the proposed antenna can establish three different modes of the pattern at all frequency.*

Keywords: *pattern reconfigurable antenna, Compact Device*

I. INTRODUCTION

With the quick growth of the wireless communication technologies, the reconfigurable antenna has motivated great concerns due to its ability to improve the system performance. The pattern reconfigurable antenna can enable the system to Bypass noisy climate and save energy by adjusting directing signals against intended user. In [1] the reconfigurable antenna is imported and analyzed to improve the achievement in MIMO system. A pattern reconfigurable antenna is practical in the phased array to expand the scanning angle coverage in [2].

In [3], a radiation frequency of pattern reconfigurable antenna for compact terminals has been proposed and reviewed. The proposed antenna can operate at 0.85GHz and 1.9GHz with directional or omnidirectional respectively. In this paper, Pattern Reconfigurable Antenna uses to Increase Radiation Frequency for Compact Device Applications is proposed and discussed. In correlation with the antenna in [3], two parasitic bar are apply to boost the impedance bandwidth. The intended antenna can cover 0.83-0.93GHz and 1.65-1.90GHz by switching the two switches on the consumed component, and it can provide three different modes of the pattern at all operating band.

II. DESIGN OF THE INTENDED ANTENNA

The design of the frequency and pattern

Reconfigurable antenna is shown in Fig. 1. Two parasitic components are set onward the consumed component. The switches are fixed into the dielectric substrate. Two parasitic bars are set on the surface of substrate. The electric permittivity and loss contiguous of the substrate are 4.4 and 0.002 respectively. The consumed component is fed by a 50 Ω coaxial probe and is set in the centre of the intended antenna. Concordant to theory of Yogi Antenna, the parasitic component can work as a director or reflector by controlling the states of the switches on the parasitic component. The frequency

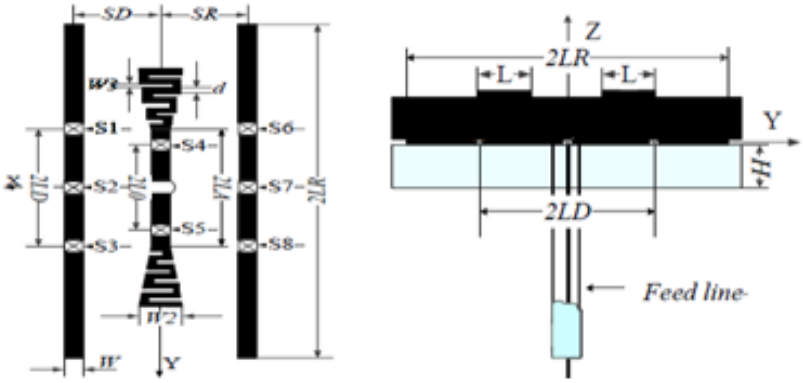

Fig. 1 the design of the proposed antenna

Reconfigurable characteristic is accomplished by controlling the states of two switches connected on the incitement component. Concordant to [5], the Q of the proposed antenna can be calculated by

$$Q = 9V_{RS} / 2kV_{oc}$$

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Where $V_{RS} = 3/4\pi\lambda_r^3$, is the wavelength in the free space at the resonance frequency $\lambda_r = \lambda/2, \lambda$ and Voc is the physical volume of the antenna. Since two parasitic bars are set on the substrate, the Voc is expanded. Thus, the value of Q is decreased, resulting in a gain of bandwidth.

III. SIMULATED RESULTS

To approve the intended radiation frequency and pattern reconfigurable antenna, Analysis HFSS-14 is used to verify the performance of the proposed antenna. The physical parameters of the antenna are: $2L_0 = 41, 2L_A = 53, 2L_R = 121, 2L_D = 51, W_1 = 3$,

$W_2 = 8, W_3 = 1, d = 2, SD = SR = 22.5, L = 15, H = 2$ (unit=mm) . From Fig. 2, we can see that the intended antenna can operate from 0.83 to 0.93GHz at Modes 1 -3 and cover the bandwidth of 1.65-1.90GHz at Modes 4-6. It can be seen from Table 2 that the bandwidths with VSWR □ 2.5 at Mode-4 and Mode -5 are 55% and 41%, respectively, which are more than those in [4].

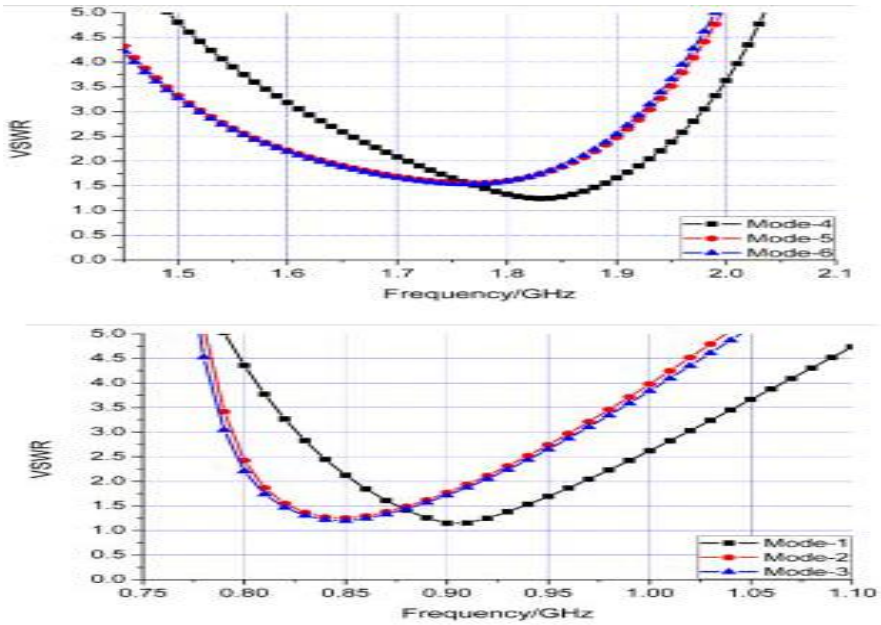


Fig. 2. The VSWR of the proposed antenna

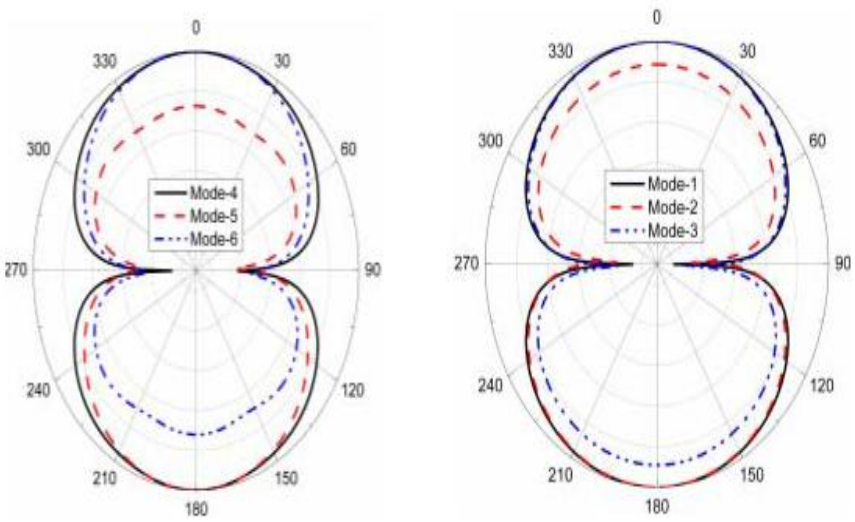
Table I: The Influence of Parasitic Bar on VSWR

Modes	With parasitic bar	Without parasitic bar
Mode-4	1.66-1.97GHz	1.82-2.08GHz
Mode-5	1.57-1.91GHz	1.81-2.05GHz

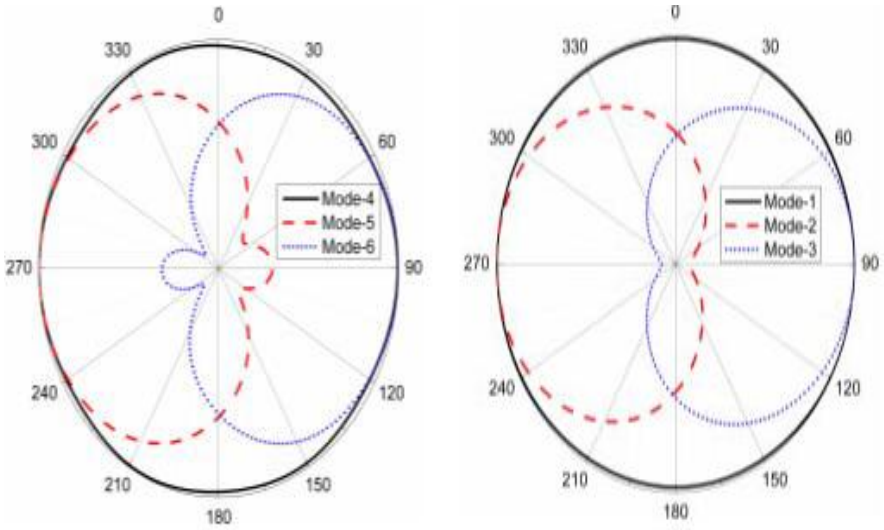
The radiation patterns have been shown in Fig. 3. The pattern at Modes 1-3 and Modes 4-6 are acquired at 0.85GHz and 1.9GHz, respectively. The proposed antenna can be applied as omnidirectional antenna at Mode-1 and Mode-4. It can be observed that the maximum beams are at 90^o and 270^o in the H-plane for other Modes.

IV. CONCLUSION

Pattern Reconfigurable Antenna uses to Increase Radiation Frequency for Compact Device Applications has been proposed. The bandwidth is considerably boosted by using two parasitic bar on the substrate. The proposed antenna covers GSM850 and DCS1800 and has three different modes of the pattern at all band.



(a) E-plan



(b) H-plan

Fig. 3. The radiation pattern of the proposed antenna

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