DESIGN OF FREQUENCY RECONFIGURABLE MULTI BAND COMPACT PATCH ANTENNA

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ABSTRACT: *The proliferation in demand for reliable, high performance radio systems and broadband services has invariably necessitated the use of reconfigurable antennas. In most wireless communication systems, spread spectrum signaling is used in mitigating crosstalk interference from users using the same channel in multiple access communication. This is due to its high efficiency, resulting in reduced susceptibility to multipath fading and improved security of data from intruders, thereby making spread spectrum signals hard to jam. However, spread spectrum signals are characterized by their relatively large bandwidths which often require the use of an antenna with the capability of operating within such bandwidths. Spread spectrum signal are most applicable in wireless local area networks WLAN and worldwide interoperability for microwave access WiMAX. A simple reconfigurable multiband antenna with two PIN diode switches for worldwide interoperability for microwave access wireless local area networks WLAN applications. The antenna Permits reconfigurable switching in up to ten frequency bands between 2.2 and 6 GHz. The proposed antenna has been simulated using Advanced Design System Software and fabricated on an FR-4 substrate. It is compact and has a slotted ground substrate. Moreover there is good agreement between the measured and Simulated results in terms of radiation pattern gain*.

Key terms: **Radiation pattern, Gain, Micro Strip, Patch Antenna, Impedance, Half Wave Dipole.**

1. INTRODUCTION

1.1 OVERVIEW OF ANTENNA

In radio a reception apparatus is the interface between radio waves proliferating through space and electric streams moving in metal conduits, utilized with a transmitter or receiver .In transmission a radio transmitter supplies an electric current to the receiving wire's terminals, and the radio wire produce the current from the present as electromagnetic waves (radio waves). In gathering, a reception apparatus catches a portion of the energy of an electromagnetic wave with a specific end goal to deliver an electric current at its terminals that is connected to a beneficiary to be intensified. Reception apparatuses are basic parts of radio gear, and are utilized as a part of radio telecom , communicate TV two-way radio, interchanges recipient, radar, PDAs, satellite correspondences and different gadgets.

1.2 RADIATION PATTERN

Radiation example of a reception apparatus can be characterized as the locus of all focuses where the produced control per unit surface is the same. The transmitted power per unit surface is relative to the squared electrical field of the electromagnetic wave. The radiation design is the locus of focuses with the same electrical field. In this portrayal, the reference is typically the best point of outflow. It is additionally conceivable to portray the order pick up of the reception apparatus as an element of the heading. Frequently the pickup is given in decibels

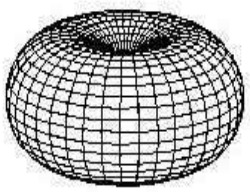

Figure 1.1 3D Radiation pattern of a half-wave dipole antenna

2. PROPOSED SYSTEM

2.1 INTRODUCTION

Reconfigurable receiving wires are dynamic reception apparatuses with the ability of adjusting their properties, for example, radiation example, polarization and recurrence with changing framework necessities or ecological conditions in a controlled and reversible way. Specifically, recurrence reconfigurable in receiving wires are helpful for assorted applications, as it decreases the transfer speed necessity of spread range flags, this is because of the way that remote applications won't have to cover every single working recurrence at the same time,

which in actuality will enhance any confinement on reception apparatuses and will enhance their functionalities without expanding their size and multifaceted nature. Other attractive qualities of recurrence reconfigurable reception apparatuses incorporate their scaled down size, minimal effort and use for an assortment of utilization coming about into their reconciliation into most present day remote frameworks

2.2 MICROSTRIP PATCH ANTENNA

In media transmission, a micro strip radio wire (otherwise called a printed reception apparatus) typically implies a receiving wire created utilizing micro strip strategies on a printed circuit board (PCB). They are for the most part utilized at microwave frequencies. An individual micro strip reception apparatus comprises of a fix of metal thwart of different shapes (a fix receiving wire) on the surface of a PCB, with a metal thwart ground plane on the opposite side of the load up. The radio recurrence current is connected (or in accepting receiving wires the got flag is created) between the reception apparatus and ground plane. Micro strip receiving wires have turned out to be exceptionally well known in late decades because of their thin planar profile which can be joined into the surfaces of shopper items, airplane and rockets;

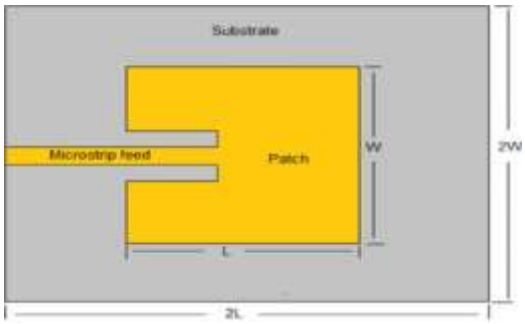

Figure 2.1 Rectangular patch micro strip antenna

2.3 FEED TECHNIQUES

Micro strip receiving wire nourish systems can be arranged in two classifications which are reaching and non-reaching. In the reaching technique, the RF Power is sustained straightforwardly to the emanating patch utilizing an associating component, for example, a micro strip line. The micro strip line and the coaxial test are cases of reaching strategy. In the non-reaching, electromagnetic field coupling will be done to exchange the power between the micro strip line and the transmitting patch. Strategies that are in these non-teaching techniques are gap coupling and closeness coupling [6]. The sustain strategy that was utilized as a part of this venture is the micro strip line bolster

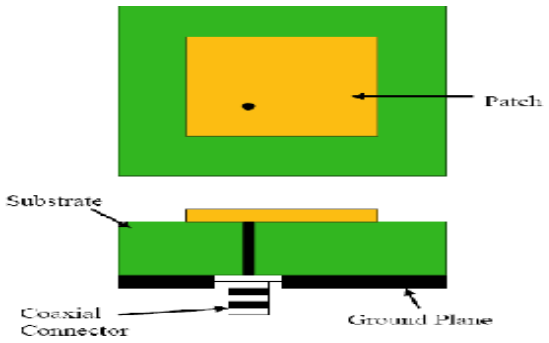

Figure 2.2 Coaxial feed of the antenna

2.4 FLAME RETARDANT-4 SUBSTRATE

"FR" remains for fire resistant, and means that security of combustibility of FR-4 is in consistence with the standard UL94V-0. FR-4 was made from the constituent materials (epoxy tar, woven glass texture support, brominates fire resistant, and so on.) by NEMA in 1968

3. ADVANCED DESIGN SYSTEM SOFTWARE

3.1INTRODUCTION

Advanced Design System (ADS) is an electronic outline mechanization programming framework created by Agilent EEs of EDA, a unit of Agilent Technologies. It gives an incorporated plan condition to creators of RF electronic items, for example, cell phones, pagers, remote systems, satellite interchanges, radar frameworks, and fast information joins. Agilent ADS underpins each progression of the outline procedure, for example, schematic catch, format, recurrence space and time area circuit recreation, and electromagnetic field reenactment, enabling the designer to completely portray and advance a RF plan without evolving instruments. Agilent EEs of has given duplicates of the ADS programming to the electrical designing offices at numerous colleges, and a substantial level of new graduates are knowledgeable about its utilization. Accordingly, the framework has discovered wide acknowledgment in industry. Promotions are a refined circuit test system and can set aside a lot of opportunity to take in all the intricate highlights. Advertisements can keep running on an assortment of working frameworks. The present variant keeps running on a UNIX machine and windows XP.

Energy is a piece of Advance Design System and it gives the reproduction apparatuses required to assess and plan results of present day correspondence frameworks

3.3 BLOCK DIAGRAM OF ADS MOMENTUM

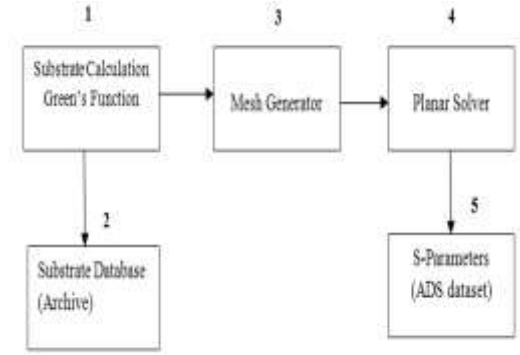

Fig. 3.1 shows the steps of ADS Momentum simulation and outputs

4. RESULTS

4.1 SIMULATION RESULTS

The proposed receiving wire is outlined and mimicked by utilizing the business electro-attractive (EM) field test system. This radio wire is created on FR4 substrate material and furthermore completed analyses on this reception apparatus. The recreation of rectangular micro strip fix radio wire has been planned and described utilizing Advanced Design System (ADS) programming and get reenactment comes about. The parameters of the receiving wire like transfer speed, radiation example and return misfortune have been discovered by utilizing Advanced Design System (ADS) programming.

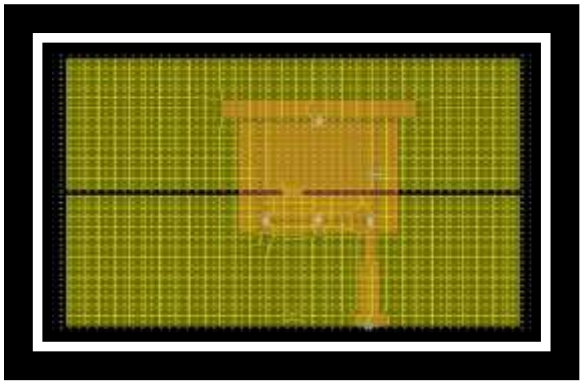

Figure 4.1 shows the proposed antenna layout front and back end.

4.2 RADIATION PATTERN.

Recreating the reconfigurable reception apparatus with the PIN diode is essential so as to accomplish great understanding. The reception apparatus was reproduced utilizing propelled Design System(ADS) programming, with SPICE models of the diodes, capacitors and inductors consolidated into the ADS plan. Return misfortune, input protection and reactance, radiation examples and additions were reenacted with various DC biasing over the PIN diodes. The outcomes got from the ADS recreation indicate sensible assertion. From this section, the multi band reconfigurable radio wire is composed and recreated by utilizing Advanced Design System (ADS) programming. The ADS programming is straightforward and simple to deal with contrast with other radio wire programming. The reproduced comes about fulfill the prerequisites of remote correspondence.

4.3 SIMULATED RESULT OF PATCH ANTENNA

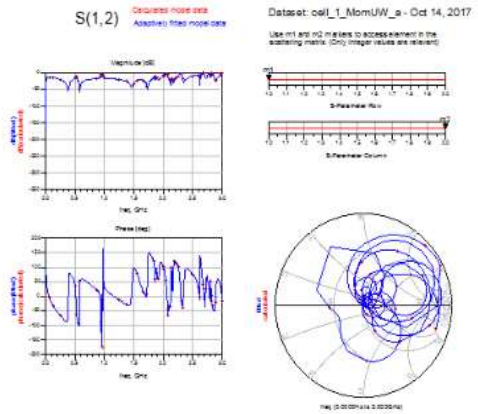

Figure 4.2 depicts the resonating frequency of proposed patch antenna is 2.4 GHz. The antenna is having best impedance matching at 2.45 GHz

5. CONCLUTION

In this undertaking, a reconfigurable receiving wire of conservative measurement is displayed. The outline utilizes a scaling down method for the fundamental radiator, including openings for both the fix and ground planes. Multi band activity was accomplished by utilizing PIN diodes as changes to reconfigure the radio wire, creating particular frequencies for WiMAX and WLAN applications. The radio wire gives up to ten diverse recurrence groups in the vicinity of 2 and 6 GHz with relative impedance transmission capacities of around 2.5 and 8%. The reproduced and estimated comes about for the arrival misfortune input protection and reactance and pinnacle picks up in various diode states fix surface show adequate execution for WLAN applications. The recurrence groups got from the receiving wire are possibly reasonable for intellectual radio remote applications. From this section, the multi band reconfigurable receiving wire is

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REFERENCES

[1] S.M.A. Nezhad and H.R. Hassani, "A novel triband E-shaped printed monopole antenna for MIMO application," IEEE Antennas WirelessPropag. Lett., vol. 9, pp. 576-579, 2010.

[2] J. Sun, H. Fang, P. Lin and C. Chuang, "Triple-band MIMO antenna for mobile wireless applications," IEEE Antennas Wireless Propag. Lett., vol. 15, pp. 500-503, 2016.

[3] C. Kuo, C. Liou and S. Mao, "Miniaturized triple-band antennas with high isolation for MIMO antenna system applications," Microw. Opt.Technol. Lett., vol. 57, no. 11, pp. 2555-2558, Nov. 2015.

[4] N. Ojaraoudi, M. Ojaroudi and K. Halili, "Design of triple-band monopole antenna with meander line structure for MIMO application," Microw. Opt. Technol. Lett., vol. 54, no .9, pp. 2168-2172, Sep. 2012.

[5] N. Ojaraoudi and M. Ojaroudi, "A novel design of triple-band monopole antenna for multi-input multi-output communication", Microw. Opt.Technol. Lett., vol. 55, no .6, pp. 1258-1262, Jun. 2013.

[6] N. Ojaroudi, N. Ghadimi, M. Mehranpour, Y.Ojaroudi and S. Ojaroudi, "A new design of triple-band WLAN/WiMAX monopole antenna for multiple-input/multiple-output applications" Microw. Opt. Technol.Lett., vol. 56, no .11, pp. 2667-2671, Nov. 2014.

[7] J. F. Li, Q. X. Chu and T. G. Huang, "A compact wideband MIMO antenna with two novel bent slits," IEEE Trans. Antennas and Propag., vol. 60, no. 2, pp. 482-489, Feb. 2012.

[8] C. H. See. R. A. Abd-Alhameed, Z. Z. Abidin, N. J. McEwan and P. S. Excell, "Wideband printed MIMO/Diversity monopole antenna for WiFi/WiMAX applications," IEEE Trans. Antennas and Propag., vol. 60, no. 4, pp. 2028-2035, Apr. 2012.

[9] C. Caloz and T. Itoh, Electromagnetic Metamaterials: Transmission Line Theory and Microwave Applications, Hoboken, NJ: Wiley Inter., 2006.

[10] A.A. Ibrahim, A.M.E. Safwat and H. El-Hennawy, "Triple-band microstrip-fed monopole antenna loaded with CRLH unit cell," IEEEAntennas Wireless Propag. Lett., vol. 10, pp. 1547-1550, 2011.