A Review on Various Feeding Process In Microstrip Patch Antenna

Jitendra Ahir[1], Bharti Courasia[2]

PG Student (ECE),Scope College of Engineering Bhopal , M.P, India[1]

HOD(ECE), Scope College of Engineering Bhopal , M.P, India[2]

Abstract- A more than a few varieties of feeding characteristic of Aperture Coupled stacked rectangular Stacked Rectangular Microstrip Antenna is experimentally studied. It is a probe fed antenna for impedance matching with 50Ω coaxial cable. This antenna can works on quite a lot of frequency variety (2.86 to 4.Sixty three GHz).. The variants of the length and width (1mm) of the Aperture Coupled stacked rectangular patch antenna had been accomplished. And it is observed dual resonance frequency with increasing decrease resonance frequency and just about steady higher resonance frequency with raises of the length & width of Aperture Coupled stacked rectangular Rectangular Microstrip Antenna. It is clearly a low cost, gentle weight medium achieve antenna, which wee can use for cell communication The enter impedance and return loss had been measured with the help of sonnet microwave studio program.

Keywords -Aperture coupling, microstrip antennas, stacked microstrip, WLAN.

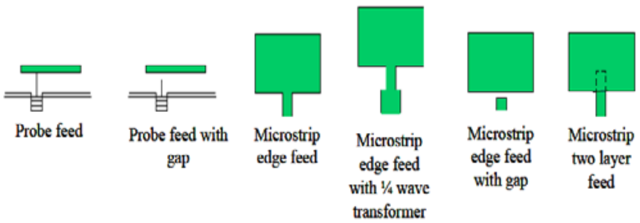
I. INTRODUCTION

The earlier decade has noticeable a rapid development of wi-fi verbal exchange programs. This continuous trend is bringing about a wave of new wi-fi gadgets and systems to fulfill the demand of multimedia applications. Multi-frequencies and multimode instruments such as cellular telephones, mobile phone jammer, wi-fi nearby subject networks (WLAN) and wi-fi personal field network position a couple of needs on the antennas. Mainly, the antennas need to have high attain, small bodily size, and multi bandwidths. Just lately there are many demands to design antennas that quilt global procedure cellular (GSM) cellular cell methods and ISM ban systems for some purposes. There are two bands for mobile telephone 0.9 and 1.Eight GHz. The band of zero.9 GHz is increased from zero.88 GHz to zero.96 GHz for slash band uplink and higher band downlink, at the same time the 1.Eight GHz starts from 1.Seventy one GHz to 1.88 GHz for cut back band uplink and higher band downlink. Additionally the mobile has one more frequency for a further software that is referred to as Bluetooth; Bluetooth radio modules function in the unlicensed industrial, scientific and medical (ISM) band of two.4GHz. The (ISM) band ranges from 2 GHz to 2.8 GHz which also comprise WLAN in accordance to IEEE 802.11g ordinary that extended throughput to up to fifty four Mbit/s utilising the same 2.Four GHz band. This challenge desires to meet precise requirement design -comparable to small measurement, low rate, low profile, narrowband, attain and directivity sufficient. The Stacked Rectangular Microstrip Antenna patch antennas are generally used seeing that of their many deserves, such as the low profile, gentle weight, small dimension and conformity. However, patch antennas have a major disadvantage: narrow bandwidth. Researchers have made many efforts to overcome this main issue and lots of configurations have been offered to prolong the bandwidth [1]. The 4 most widespread feeding tactics are the Stacked Rectangular Microstrip Antenna line, coaxial probe, aperture coupling, and proximity coupling [2] [3]. In this paper a single Stacked Rectangular Microstrip Antenna line-fed rectangular h-slot patch antenna is proposed to be work with the GSM, Bluetooth and WLAN bands.

An aperture coupled Stacked Rectangular Microstrip Antenna patch antenna resonating at two frequencies is designed using stacking. Stacking is a procedure to acquire the dual band conduct and to broaden the impedance bandwidth of the antenna. It includes a multilayered structure consisting of quantity of dielectric substrates and patches. In it parasitic factors (or stacked patches) are placed over the driven aspect (or the essential patch).

II. FEEDING TECHNIQUES

Stacked Rectangular Microstrip Antenna patch antennas can be fed by means of a sort of ways. These ways may also be categorised into two categories- contact and non-contact. Within the contact approach, the RF energy is fed immediately to the radiating patch utilizing a connecting detail corresponding to a Stacked Rectangular Microstrip Antenna line. In the non-contact scheme, electromagnetic area coupling is achieved to switch vigor between the Stacked Rectangular Stacked Rectangular Microstrip Antenna Antenna line and the radiating patch [6] [7]. The four most standard feed methods used are the Stacked Rectangular Microstrip Antenna line, coaxial probe (each contact schemes), aperture coupling and proximity coupling (both non-contact schemes) [8]. The triangular-slot Aperture Coupled stacked Stacked Rectangular Microstrip Antenna line feed is used right here. In this sort of feed method [3], a conducting strip is linked instantly to the brink of the Stacked Rectangular Microstrip Antenna patch. The conducting strip is smaller in width as compared to the patch and this type of feed arrangement has the capabilities that the feed may also be etched on the identical substrate to provide for a planar structure. To check the impedance of the feed line to the patch with out the need for any additional matching detail can be accomplished by the inset reduce in the patch.



Figur. 1

III. INSET FEED

due to the fact the current is low at the ends of a half of-wave patch and raises in magnitude toward the core, the input impedance (Z=V/I) would be reduced if the patch used to be fed in the direction of the core. One method of doing that is through making use of an inset feed (a distance R from the tip) as shown in determine 2.

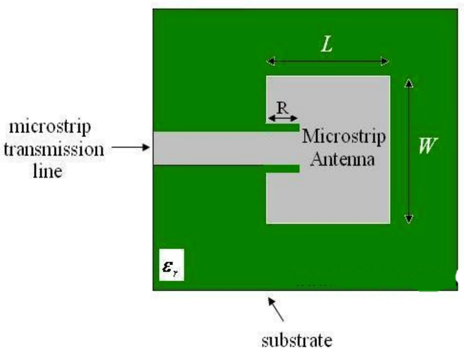


Figure 2. Patch Antenna with an Inset Feed.

Considering the present has a sinusoidal distribution, moving in a distance R from the top will broaden the present with the aid of cos(pi*R/L) - this is just noting that the wavelength is 2*L, and so the section difference is 2*pi*R/(2*L) = pi*R/L. The voltage additionally decreases in magnitude by way of the same quantity that the present increases. As a consequence, utilizing Z=V/I, the input impedance scales as:

$$Z_{in}(R) = \cos^2\left(\frac{\pi R}{L}\right) Z_{in}(0)$$

In the above equation, Zin(zero) is the input impedance if the patch was once fed at the end. Thus, by way of feeding the patch antenna as proven, the input impedance may also be reduced.

IV. FED WITH A QUARTER-WAVELENGTH TRANSMISSION LINE

The Stacked Rectangular Microstrip antenna can be matched to a transmission line of attribute impedance Z0 by way of using a quarter-wavelength transmission line of attribute impedance Z1 as proven in figure 3.

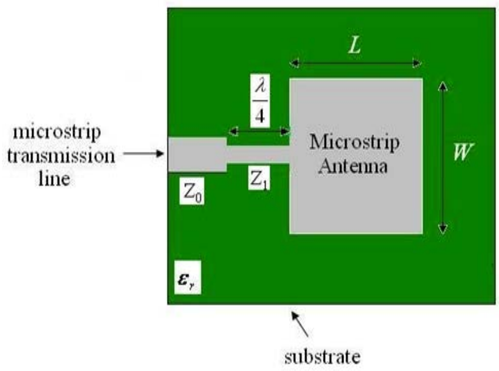


Figure 3. Patch antenna with a quarter-wavelength matching section.

The venture is to check the input impedance (Zin) to the transmission line (Z0). If the impedance of the antenna is ZA, then the enter impedance viewed from the starting of the quarter-wavelength line turns into

$$Z_{in} = Z_0 = \frac{Z_1^2}{Z_A}$$

The parameter Z1 can also be altered by using altering the width of the quarter-wavelength strip. The wider the strip is, the cut down the characteristic impedance (Z0) is for that element of line.This input impedance Zin can be altered by using decision of the Z1, so that Zin=Z0 and the antenna is impedance matched.

V. COAXIAL CABLE OR PROBE FEED

Stacked Rectangular Microstrip antennas may also be fed from beneath by way of a probe as proven in figure 4. The outer conductor of the coaxial cable is hooked up to the ground aircraft, and the core conductor is accelerated as much as the patch antenna.

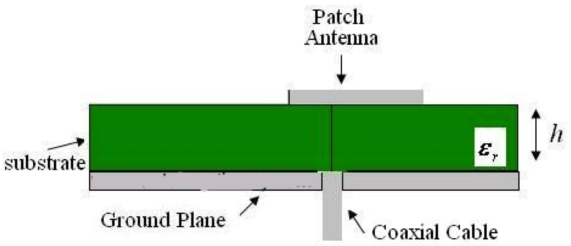


Figure 4. Coaxial cable feed of patch antenna.

The coaxial feed introduces an inductance into the feed that can have got to be taken into consideration if the height h gets gigantic (an appreciable fraction of a wavelength). Moreover, the probe may also radiate, which can result in radiation in undesirable guidelines. The function of the feed can also be altered as before (within the identical approach as the inset feed, above) to control the enter impedance.

VI. COUPLED (INDIRECT) FEEDS

The feeds above may also be altered such that they don't directly touch the antenna. For instance, the probe feed in figure 4 can be trimmed such that it does no longer extend all the approach up to the antenna. The inset feed will also be stopped simply before the patch antenna, as shown in figure 5.

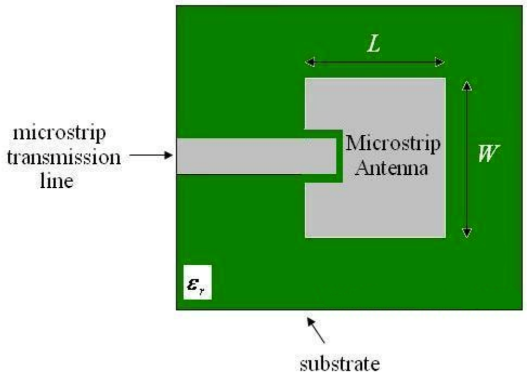


Figure 5. Coupled (indirect) inset feed.

The expertise of the coupled feed is that it adds one other measure of freedom to the design. The gap introduces a capacitance into the feed that can cancel out the inductance brought by using the probe feed

VII. APERTURE FEEDS

A different method of feeding Stacked Rectangular Microstrip Antenna is the aperture feed. On this manner, the feed circuitry (transmission line) is shielded from the antenna by using a conducting aircraft with a hole (aperture) to transmit energy to the antenna, as proven in determine 6.

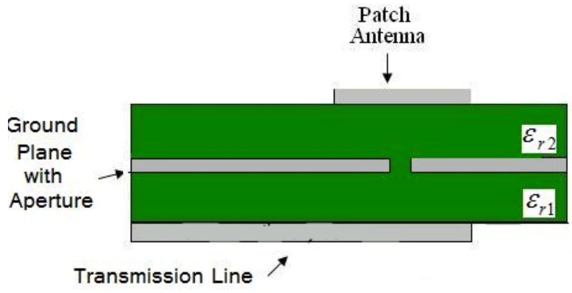


Figure 6. Aperture coupled feed.

The higher substrate can also be made with a shrink permittivity to produce loosely bound fringing fields, yielding higher radiation. The lower substrate may also be independently made with a excessive worth of permittivity for tightly coupled fields that do not produce spurious radiation. This is done by means of thoroughly controlling the inset position. The drawback of this process is multiplied main issue in fabrication. For this reason this is an easy feeding scheme, due to the fact that it supplies ease of fabrication and straightforwardness in modeling as well as impedance matching. However as the substrate thickness increases, dielectric constant decreases, radiation loss, floor waves and spurious feed radiation raises, which for functional designs restrict the bandwidth (usually 2–5%). The comparison between the approaches feeding is illustrated in table 1

Table 1 Comparison of Feed Techniques [3]

Characteri stics	Stacked Rectangular Microstrip Antenna Line Feed	Coaxial Feed	Aperture Coupled Feed	Proxim ity Couple d Field
Spurious Feed Radiation	More	More	More	More
Reliability	Better	Poor due to soldering	Good	Good
Ease of fabrication	Easy Soldering and drilling	needed Alignmen t	required Alignmen t	require d
Impedance	matching	Easy	Easy	Easy

VIII. CONCLUSIONS

In this paper, the small a couple of-band traingular-slot Aperture Coupled stacked rectangular Stacked Rectangular Microstrip Antenna antenna are designed. The parameters, acquire, return losses, copolar and move-polar are shown. The feed line method and sonnet microwave studio software for simulation are used. The reap and return losses had been just right for these bands. The antenna is designed to be used in multi-band cellular cellphone systems or jammer system functions, protecting the GSM and ISM bands.

IX. REFERENCES

[1] Dong-Hee Park; Yoon-Sik Kwak, "Design multi-Band Microstip patch antenna for wireless terminals", IEE, Jeju ,2008.

[2] D. M. Pozar, "Microstrip Antennas," Proc. IEEE, Vol. 80, No. 1, pp. 79–81, January 1992.

[3] G. Jegan . A.Vimala juliet . G. Ashok kumar, "Multi Band Microstrip Patch Antenna for Satellite Communication" 2010 IEEE.

[4] D. H. Schaubert, D. M. Pozar, and A. Adrian, "Effect of Microstrip Antenna Substrate Thickness and Permittivity: Comparison of Theories and Experiment," IEEE Trans. Antennas Propagat., Vol. AP-37, No. 6, pp. 677–682, June 1989.

[5] Constantine A. Balanis, "Antenna Theory Analysis And Design" Wiley-Interscience,2005

[6] W. Weichung, C.T.M. Choi and w. Shuming "Optimal Feed Positions for Microstrip fed Rectangular Patch Antennas by Finite Difference Time Domain Analysis", Microwave conference 2001. Proceedings of APMC 2001, Taipei, Taiwan. 3-6 December 2001.

[7] B.T.P.Madhav, PROF. Vgkm Pisipati, K V L Bhavani, P.Sreekanth, P.Rakesh Kumar. "Rectangular Microstrip Patch Antenna On Liquid Crystal Polymer Substrate" Journal of Theoretical and Applied Information Technology 2005 - 2010 JATIT.

[8] A. T. Kazi, Md. Bellal Hossain, Md. Javed Hossain, "Designing a high bandwidth Patch Antenna and comparison with the former Patch Antennas" Canadian Journal on Multimedia and Wireless Networks Vol. 2, No. 2, April 2011.

[9] P. Dong-Hee; K. Yoon-Sik, "Design Multi-Band Microstrip Patch Antennas for Wireless Terminals" 2007IEEE.

[10] A. B. Mohamed, E. Fatiha, B. Mohamed, M. Ahmed, "Design and Dosimetry of a New Multi-band Patch Antenna for Wireless Communications", 2009 IEEE.

[11] H. F. AbuTarboush1, R. Nilavalan1, K. M. Nasr2, H. S. Al-Raweshidy1 and D. Budimir3, "A Reconfigurable H-Shape Antenna for wireless Applications" 201 0 IEEE.