Simulation and Analysis of Planar Inverted F-Antenna for 4G Applications Using L-Band

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Abstract:— In the recent years, the mobile industry with different wireless services and applications on the same handheld device is growing rapidly. So, the user can use the various services and applications from the same handset. For the operation of these applications and the services, handset needs an antenna, which covers all the frequency bands of these wireless applications and services. The answer of these question is PIFA (Planner inverted F type antenna).But the PIFA has the disadvantage of the low bandwidth. The proposed design in the thesis will have smaller size and covering the almost all frequency bands of the wireless services and applications.

Keywords:– Rectangular Micro strip Patch Antenna, Coaxial Probe Feeding, VSWR ,Gain, Return Loss etc.,

I. INTRODUCTION

An antenna is an Electrical device which Converts Electric into Radio Waves, and Radio Waves to Electric signal or Electric power. It is usually used with a radio transmitter or receiver. With the help of duplexer a single antenna can be used for the transmission and receiver. In transmission, a high frequency alternating current given to the antenna's terminals and the antenna radiates the energy in the form of radio waves from the current. In reception, an antenna intercepts some of the power of a radio wave in order to produce a small voltage at its terminals that is applied to a receiver, which is amplified with the help of amplifier.

II.GEOMETRY OF MICRO STRIP PATCH ANTENNA

Antennas can also be made using printed circuit techniques. Various shapes and structures can be etched on a single- or double-sided copper-clad dielectric. Different classes of antennas can be manufactured using this method. Due to their many advantages patch antennas are very popular. A tremendous amount of work has been done on micro strip antennas over the past 25 years. These antennas are easy to handle and are light in weight.

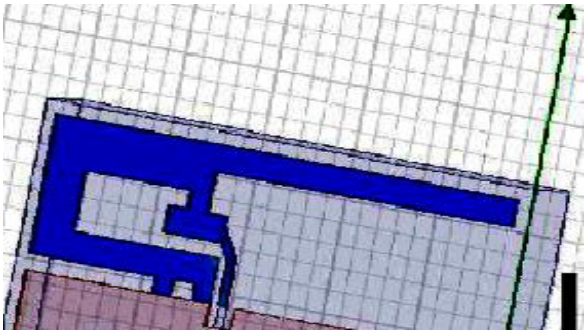

Fig 1: Design of Planar Inverted F-Antenna

This is the designed antenna with ground, substrate, patch

III.SIMULATIONRESULTS

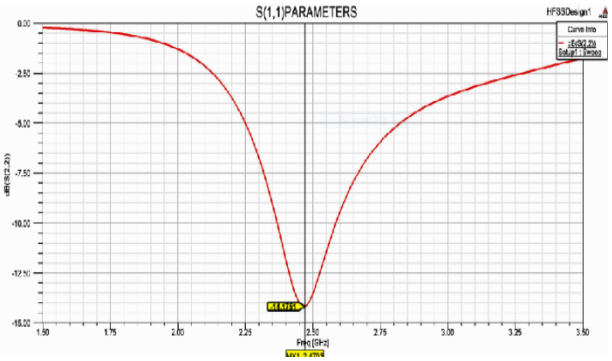

Fig 2: Scattering Parameter

Return loss is generally the loss of signal power which occurs from the reflection produced at a discontinuity or irregularity in a transmission line or optical fiber or the radiating element of the antenna. This discontinuity or irregularity may be a mismatch with the terminating load or with a device inserted in the line. It is usually expressed as the ratio in decibels (dB) as:

$$RL = 10\log Pi/Pr$$

Return loss is related to both standing wave ratio (SWR) and reflection coefficient (Γ). Increasing return loss corresponds to lower SWR. Return loss is a measure of how well devices or lines are matched.

A match is good if the return loss is high. A high return loss is desirable and results in a lower insertion loss. Return loss is used in modern practice in preference to SWR because it has better resolution for small values of reflected wave

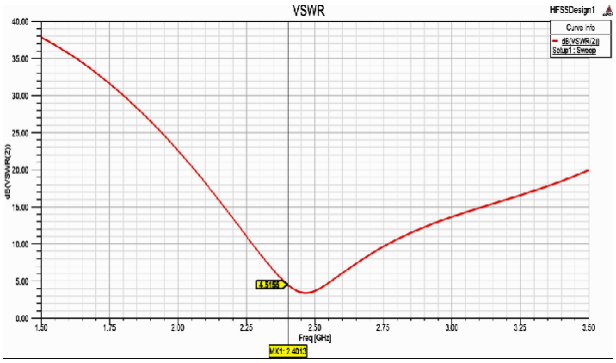

Fig 3: VSWR Graphh

VSWR (Voltage Standing Wave Ratio), is a measure of how efficiently radio-frequency power is transmitted from a power source, through a transmission line, into a load

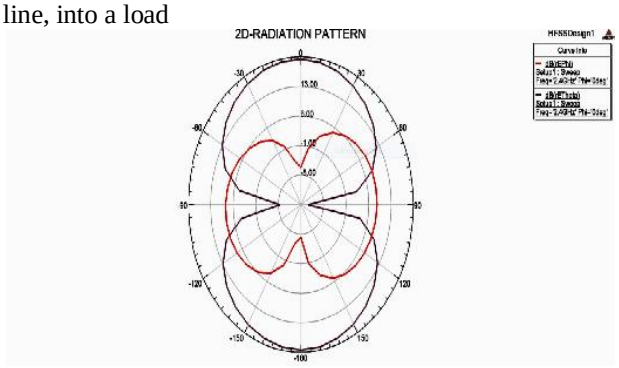

Fig 4: Radiation Pattern

In the field of antenna design the term radiation pattern (or antenna pattern or far-field pattern) refers to the directional (angular) dependence of the strength of the radio waves from the antenna or other source. Particularly in the fields of fiber optics, lasers, and integrated optics, the term radiation pattern may also be used as a synonym for the near-field pattern or Fresnel pattern. This refers to the *positional* dependence of the electromagnetic field in the near-field, or Fresnel region of the source. The near-field pattern is most commonly defined over a plane placed in front of the source, or over a cylindrical or spherical surface enclosing it.

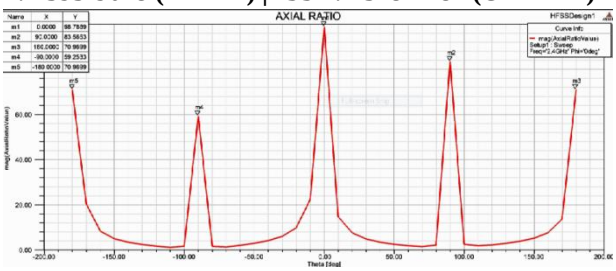

Fig 5: Axial Ratio

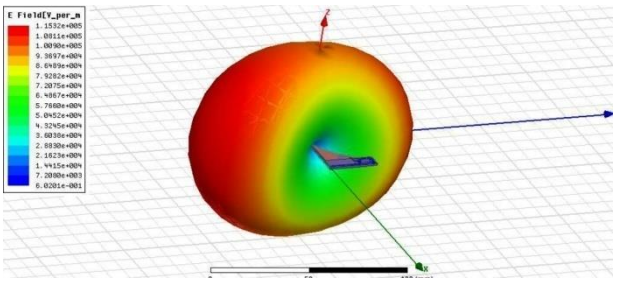

Fig 6: 3D Polar plot

Photon polarization, the mathematical link between wave polarization and spin polarization, vacuum polarization, a process in which a background electromagnetic field produces virtual electron-positron pairs

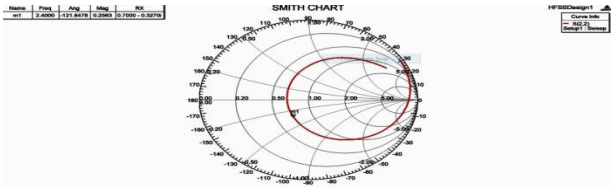

Fig 7: Smith Chart

Fig 8: Graph of Gain

Directive gain or directivity is a different measure which does *not* take an antenna's electrical efficiency into account. This term is sometimes more relevant in the case of a receiving antenna

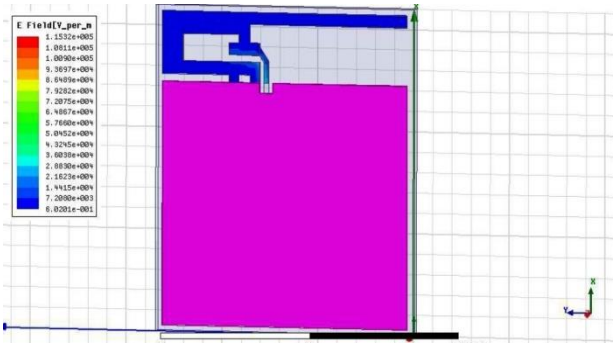

Fig 9: Current distribution

The transfer of current through the discontinuities or irregularities such as slots and slits in the planar radiating element produces excitation of currents through the ground plane as well through the well known phenomenon of coupling. The equipment is coupled to the external world for the transmission of waves through the wave port. The wave port is an element which is connected to the radiating element through an assembly made up metallic elements such as coax, coax pin and the feed pin. This assembly made up of coax and few other elements is cylindrical in shape and Teflon is the material selected for them due to the low dielectric and transmission losses and high bulk conductivity.

IV. CONCLUSION

A low profile and compact antenna with single feed and one radiating patch is presented in this paper. The antenna resonates at 1.83 GHz and 2.28 GHz with return loss - 37.56 and -29.55 respectively.

V.REFERENCES

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