A coplanar waveguide fed compact t- shaped antenna for WIMAX and WLAN applications

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Abstract

Objectives: A novel T–shaped coplanar waveguide (CPW) fed antenna is designed for WLAN and WIMAX applications.
Methods/Statistical analysis: The proposed antenna is operating at a frequency of 5.85 GHz. The proposed antenna has been designed using a FR4 substrate and it is simulated using mentor graphics IE3D simulator version 14.0.
Findings: The proposed T- shape antenna was printed FR4 substrate with dielectric constant of 2.4 and thickness is 0.8 mm. It is useful in monitoring and controls the movement of objects and also helps in tracking of the goods in industries without the use of physical contact in a convenient way.
Application/Improvements: The antenna shows a maximum gain of 1 dBi at resonant frequency and it has shows lower return loss, broader bandwidth and better impedance matching.

***Keywords*:** Wi-Max, WLAN, coplanar waveguide (CPW), FR4 substrate.

1. Introduction

In this digital rising technology, wireless communication plays a prominent role and also acts as a better compensation for analog communication. Wi-Max Antennas has become a highly competitive and emerging technology in the industry communities of telecommunication. It is useful in monitoring and control the movement of objects and also helps in tracking of the goods in industries without the use of physical contact in a convenient way, many antennas were designed and fabricated using it for various applications. Precisely in Wi-Max applications to generate the operating frequency at Wi-Max standard at 2.5/3.5/5.5GHz given by IEEE802.16, it has been preferred to study many antenna structures and its designation on Wi-Max application [1].

Antennas have become a highly competitive and emerging technology in the industry communities of telecommunication [2]-[3]. It is useful in monitoring and controls the movement of objects and also helps in tracking of the goods in industries without the use of physical contact in a convenient way. Many antennas were designed and fabricated using it for various applications [4]. Precisely in Wi-Max applications to generate the operating frequency at WiMax regular at 5.8GHz given by IEEE802.16. It has been preferred to study many antenna structures and its designation on Wi-Max application [5].

Dual band rejection characteristics of dense UWB Dielectric resonator antenna for WiMAX/WLAN Bands. Embedding a stub that is situated to the empty middle of a T shaped feed line is used for realizing the bandwidth improvement and the first nick. The proposed antenna size is at 5.8GHz [6,7]. The antenna consists of CPW fed antenna because they have a relatively wide band width. Measured results shows that the improving gain of CPW single antenna and arrays, are presented as having desirable features [8-9]. This proposed antenna is designed using FR4 substrate with Dielectric constant of 2.4 and loss tangent 0.002. The proposed antenna consists of a rectangular strips and T shaped slots. Tuning the geometrical parameters like h and t, to obtain a good impedance condition of the compact T shaped antenna.

The antenna designs which are appropriate for WLAN (5.8 GHz) and WiMAX (5.8 GHz) operations have been studied. The antenna fed by a Coplanar Waveguide has been presented many features like easy fabrication, smaller occupation, lower surface wave loss and single metallic layer [10]. The result can be improved by antenna design structure, fabrication and array elements. The rectangular monopole antenna is providing the bandwidth to cover WIMAX and WLAN applications.

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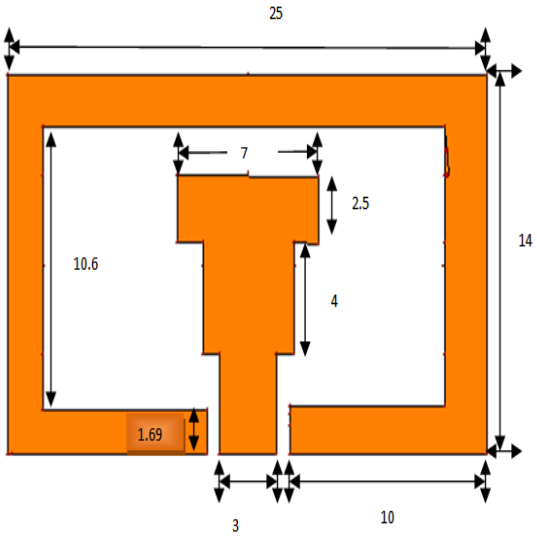
2. Antenna design

The geometric view of the proposed antenna is designed for WIMAX and WLAN operation is shown in Figure 1. The proposed T- shape antenna was printed FR4 substrate with dielectric constant 2.4 and thickness of 0.8 mm. The form of the gap in the ground plane is distorted by one to one observing the reflection coefficient characteristics.

Figure 1. Antenna structure (All dimensions are in mm)



3. Results and discussion

In this digital rising technology, wireless communication plays a prominent role and also acts as a better compensation for analog communication. Wi-Max Antennas has become a highly competitive and emerging technology in the industry communities of telecommunication.

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3.1. Return loss

The simulated return loss characteristics of the proposed structure shown in Figure 2. It is observed experimentally that the CPW fed monopole is vibrating at 5.8 GHz, casing the broader impedance bandwidth as shown in Figure 2 and Figure 3. From that figure bandwidths cover a frequency range from of 5.8GHz with a bandwidth of an antenna of is shown in Figure 3.

Figure 2. Return loss characteristics of proposed antenna

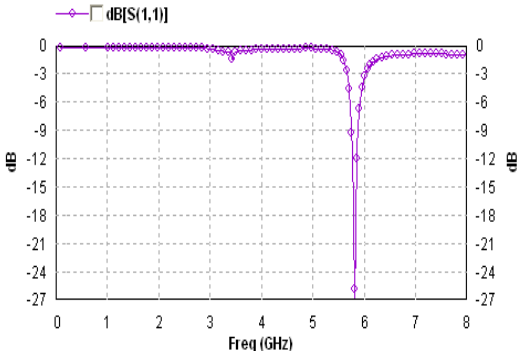

Figure 3. VSWR characteristics

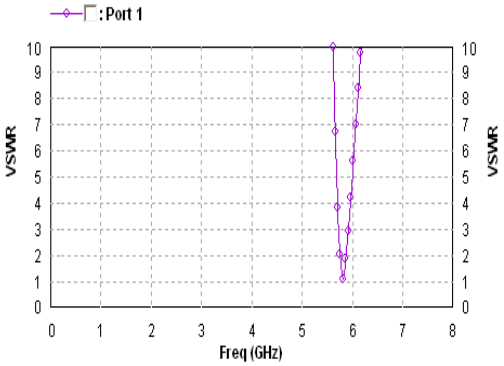

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Figure 4. Radiation pattern for elevation plane

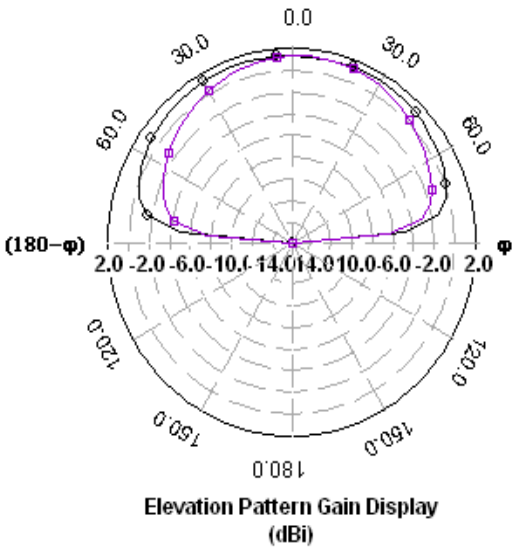


Figure 4 and Figure 5 show the radiation pattern results of elevation and azimuth characteristics. The gain characteristic of proposed antenna shows maximum gain of 1.5dBi at 5.85GHz for both E plane and H plane pattern.

Figure 5. Radiation pattern for azimuth plane

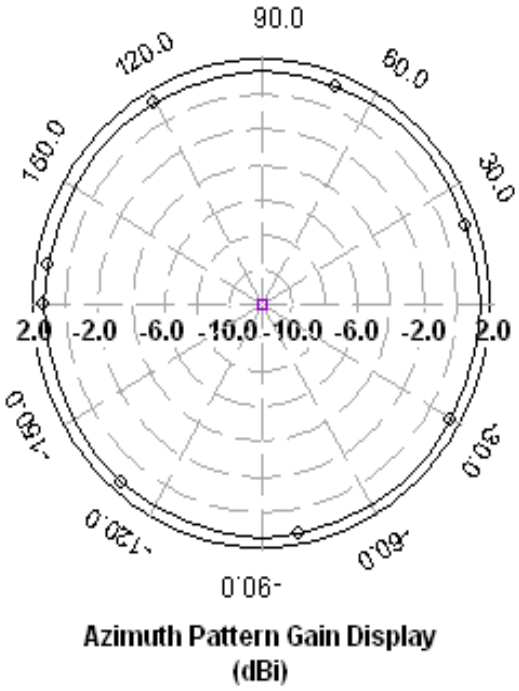
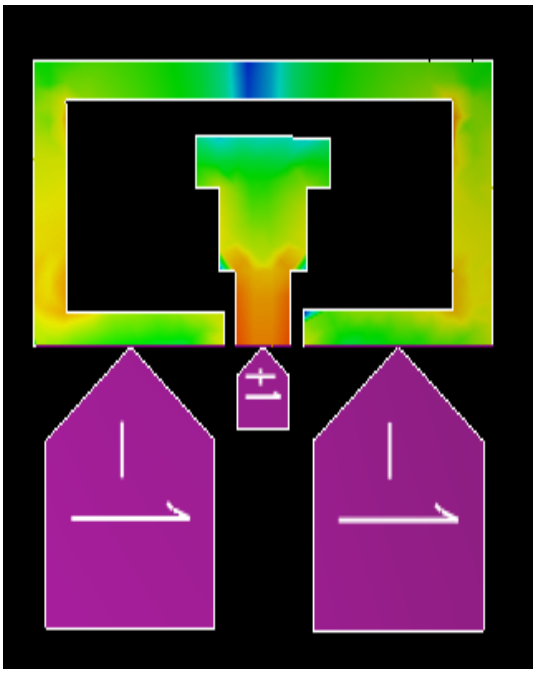


Figure 6. Current distribution of proposed antenna



3.2 Current distribution

The yield shows a maximum of 1.5dBi at 5.8GHz. Figure 6 shows the 3D current distribution of proposed antenna which shows maximum current distribution in the WiMAX antenna at 5.8GHz frequency. Green color region shows maximum current distribution at resonant frequency.

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4. Conclusion

In this work, an original T shaped structure is intended and accessible for Wi-Max applications. This antenna is compressed in evaluation to obtainable antennas. It operates at the frequency at Wi-Max vary for the given applications. This antenna is convention desired antenna gain and return loss at different operating frequency bands. Therefore, the proposed antenna is the appropriate applicant for the occurrence of 5.8GHz in the field of Wi-Max applications.

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