Optimization of a Fifth Generation Communication Based Dual-Band Microstrip Antenna

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Abstract:
In this work a dual band micro-strip patch antenna have been designed which is having a better radiation pattern for fifth generation communication in indoor & outdoor mode. The proposed antenna is having a frequency range of 24 GHz–55 GHz. The antenna is basically a dual band micro-strip antenna having rectangular metallic patch with FR4 substrate material which consist of Loss of Tangential Component is 0. 02 & Permittivity of the medium is 4.4 considering thickness 1. 6mm. The required micro-strip patch antenna has been designed using Ansys Electronics Desktop 2022 RI & the frequency surface is Finite Element Method (FEM). In this research an optimization, have been done for betterment of an antenna performance & enhanced the data transmission efficiency. The optimization & analysis have been done by changing the width & length of the designated patch of the simulated antenna process suggest that for the specific substrate the optimized length & width of the antenna can provide best result in the aspect of different antenna parameters like losses in antenna, standing wave ratio, impedance parameters & the coverage or radiation pattern of the antenna. The proposed antenna can provide -50dBi gain at 25 GHz frequency & -44dBi at a range of 57 GHz. The proposed antenna can also provide a better radiation pattern, Z parameter & a consistent steady VSWR in a range of 1 with an efficiency nearly 98%.

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The telecommunication system are now a days an inseparable component for a civilized society. The aggressive growth of telecommunication systems for the last few decades has made the communication as an essential commodity in daily life. So day after day, the use of mobile data, broadband data & Wi-Fi data are increasing exponentially. Wireless communication systems are the major component, which are taking the key role for the drastic growth of the data uses for a huge consumer base. As the wireless communication, systems can provide a low-cost lightweight& low profile antenna, which can provide high level of performance maintaining a wide range of bandwidth. [1] In spite of having such facilities the global bandwidth shortage are happening. To reduce this effect some motivational use of millimeter band wave frequencies are very much necessary to fulfill the requirement. [2] To fulfill the spectrum requirement for future broadband communication multiband single feed antennas are used for the purpose of millimeter wave application. Some researchers have already used the Continued Reading design for different multiband planner feed antennas [3 –7]. In spite of having many more advanced communication systems, still some problems are there in the antenna designing aspect to fulfill the huge requirement of data uses & bandwidth. Now to satisfy the huge requirement of a suitable antenna has become a challenging issue in wireless communication. To fulfill the huge requirement, the micro-strip patch antenna is very suitable for wireless communication as it has its simple design with the flexibility of variable shapes & low installation cost as well as it is having the facility to fabricate with microwave & millimeter wave circuits in an integrated manner & miniaturization mode [8 –10]. The interesting feature of a micro-strip antenna consists of different patches are having four different characteristics like, a patch, which is basically a flat metallic region, a ground material having basically greater size than the patch material, & a dielectric substrate which is also variable in nature associated with a feed supply power element for incorporating different forms of power [11 –13].

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