Seminar

Institute for Plasma Research

Title : Design and Development of Advanced Multiband Printed Antennas

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Time : 10.30 AM

Venue : Online - Join the talk: https://meet.ipr.res.in/Dr.PawanKumar_PDFTalk

Abstract :

With the rapid development of wireless communication in recent years, the demand of novel antennas is increasing rapidly to meet the requirements of modern wireless applications. Various useful bands which are going to explore the future of wireless communication have attracted the interest of many researchers and scientists. Researchers are extensively focused on high data rate transmission and compactness of the antenna. Antenna plays a vital role in wireless communication, so in order to meet the demands of recent wireless technology different multiband, circularly polarized, reconfigurable antennas have been designed. Antenna designed for space and defence applications is mainly focused on performance but when it is for commercial use cost is more important. Nowadays development of wireless communication has changed the present scenario, the wireless devices are installed in homes, colleges, schools and business centers for different purposes. The antenna designed should be novel, compact in size, multifunctional and cost effective for different Wireless Transmission.

Printed antennas have different advantages such as light weight, low fabrication cost, low volume, capable of supporting linear and circular polarization, capable of supporting dual polarization, integrable with circuits, feedline and matching networks. These antennas are conformable to planar and non-planar surfaces, inexpensive in manufacturing using printed circuit technology and compatible with MMIC designs. However, there are many limitations, one of the major restrictions is their narrow bandwidth and large ohmic loss. Other limitations are tolerance problem, low gain, low efficiency, polarization purity, low power handling capacity, high level of cross polarization etc. The design complexity gets improved due to their smaller in size. Wireless communication is impossible without antenna, so antenna has become an important substitute to communication technology. In the Literature survey many multiband antennas have been investigated operating in dual and triple band but the researchers are mainly focused on multiband antenna covering useful band application. In spite of encouraging features of multiband, still there are various challenges making this technology utilizing its full potential. Designing multiband antennas covering useful bands Bluetooth, WiMAX and WLAN is really challenging task.

The main objective of my research work is to design compact, cost effective, application oriented multiband antennas for wireless communication. There are many challenges in field of multiband with the new emerging technologies. One of these challenges is how to design antenna elements which are capable for replacing several single band antennas. In this thesis, various multiband antenna designs are investigated. In order to understand their operating mechanism, different parameters have been studied separately. Another challenge related to the design is band restriction that is Bluetooth (2.4-2.485 GHz), WiMAX (3.3-3.7 GHz, 5.25-5.85 GHz) and WLAN (2.4-2.48 GHz, 5.15-5.35 GHz, 5.72-5.825GHz

The research mainly focuses on achieving the following objectives:

- To design triple band antenna for different wireless application.
- To design small multiband antennas which are applicable to wireless USB-dongle modem for WLAN and WiMAX application
- To design antenna having combination of both linear and circular polarization

➢ Dual-band dual-sense reconfigurable antenna.

Triple band microstrip antenna is designed and analyzed using microstrip feedline, slot, parasitic element to obtain Bluetooth (2.4-2.485 GHz), WiMAX (3.3-3.7 GHz) and WLAN (5.15-5.35 GHz, 5.72-5.825GHz) bands for different wireless applications.
Design and analysis of very compact, triple band stacked monopole antenna for USB-dongle application has been achieved for WiMAX (3.4-3.69GHz) band and WLAN (2.4-2.48 GHz, 5.15-5.35 GHz, 5.725-5.825 GHz) bands.
Triple band CPW-fed antenna designed for Bluetooth (2.4-2.485 GHz), WiMAX (3.3-3.65 GHz, 5.25-5.85 GHz) and WLAN (5.15-5.35 GHz, 5.725-5.825 GHz) bands having both linear and circular polarization.
Dual-band dual-sense reconfigurable circularly polarized slot antenna designed for WLAN (2.4-2.48 GHz, 5.15-5.35 GHz) for MIMO and cognitive radios.