PREFACE

In recent years, the tremendous developments in the wireless communication technology and progress in integrated circuit technology have led to a continual decrease in the overall size of wireless devices. In addition to these developments, the demand of providing wireless services over a wide frequency band with high data rate has also witnessed exponential growth. The demands of high data rate and wide frequency band can be fulfilled by implementing ultra wideband technology. As the size of wireless devices decreases, the inbuilt antenna size must also decrease. This requirement of wireless systems can be met by using microstrip antennas due to their key advantages like low cost, low weight, compact size, low profile, etc. However, their narrow bandwidth has limited their use. Therefore, several efforts have been made to design planar UWB antennas by enhancing the bandwidth without affecting the dimensions. Techniques used to enhance the bandwidth of printed antennas have been undertaken by author to achieve ultra wideband performance. In the present endeavor, the author has made an effort to enhance the antenna bandwidth by using microstrip feeding or coplanar waveguide feeding technique and different antenna geometries like monopole, fractal or dipole. The designed antenna structures yielded wide bandwidth along with miniaturized dimensions. The detailed analysis of simulation and experimental investigations are presented in following six chapters:

In the first chapter, a brief introduction to ultra wideband technology and various UWB antenna structures i.e. monopoles, fractals and dipoles are presented emphasizing mainly on the methods used to achieve ultra wideband performance. This is followed by detailed literature survey on this topic.

Various characteristics, advantages, applications of UWB technology along with challenges and techniques used for designing UWB antennas are discussed in chapter two.

Design and analysis of ladder shaped UWB fractal antenna structure is taken up in chapter three. The simulations are carried out by using finite element method based high frequency structure simulator (HFSS) and finite integration technique based computer simulation technology's microwave studio (CST MWS) software. The simulated and experimental results are discussed and compared.

In chapter four, a beveled UWB monopole antenna structure is designed and analyzed. Simulated and experimental investigations are illustrated and compared. The effect of various parameters and experimental investigations of the antenna performance are also studied.

Design and development of crescent shaped UWB dipole antenna structure is carried out in chapter five. The parametric analysis is also presented in detail.

In the last chapter, major contributions of the entire investigations are summarized. This chapter also emphasizes on the future challenges on this topic.