Abstract - In this paper, Coplanar Waveguide fed dual V-shaped Implantable monopole antenna for biomedical applications is proposed. The antenna has a simple structure with low profile and is placed on human tissues like Muscle, Fat and Skin. The designed antenna is made compatible for implantation by embedding it in a FR4 substrate. The proposed antenna is simulated using the method of moment's software IE3D by assuming the predetermined dielectric constant for the human muscle tissue, fat and skin. The antenna works in the Industrial, Scientific and Medical Band (900-915 MHz and 2.4-2.48 GHz). Simulated maximum gains attain -23dBi and -19.5dBi in the two desired frequency ranges of 903MHz and 2.43GHz respectively. The antenna parameters such as radiation pattern, return loss, VSWR, current distribution and gain of these antennas were examined and characterized.

Keywords - ISM Band, Monopole Antenna, Coplanar Wave Guide Feed, Biomedical Applications.

I. INTRODUCTION

The number of microsystems designed to be implanted into the human body has increased in recent years [1]. A wide variety of sensors, microelectrodes, drug delivery devices, micro machined transducers, micro actuators, surgical tools, etc. have been proposed and Some devices may need a wireless communication system and the communication link is a major challenge [2]. The design of the antennas for biotelemetry applications is therefore currently of great interest. The implantable antennas promise large improvements in patient's care and quality of life. Pacemaker communication, glucose monitoring, insulin pumps and endoscopy are just a few examples of medical treatments that could take advantage of wireless control [3].

In recent years, much work has been performed on the design and characterization of implantable antennas [3-5]. In general, the design of the antennas takes into consideration specific single tissues and they are tested using tissue equivalent liquids [4-7], mimicking gels [4] and animals [12]. The implanted antennas were designed to operate in the 402-405MHz frequency band approved by the Federal Communications Commission (FCC) for Medical Implant Communication Services (MICS) [8].

Understanding the human body's effect on RF wave propagation is complicated by the fact that the body consists of components that each offers different degrees, and different types of RF interaction [10]. In order to construct a reliable wireless communication links from/to the human body, the body has to be characterized as a medium for wave propagation [11]. To characterize the human body as a medium for radio frequency wave propagation, the electrical properties of the body tissues should be known for the frequency of interest.

In this paper an implanted antenna for the human body medical device, their characteristics, and human body as a medium for radio frequency propagation at 903MHz and 2.43GHz are studied. All the results in this work were obtained using the Method of Moments by IE3D Simulator ver.15.

II. GEOMETRICAL VIEW OF PROPOSED ANTENNA

Fig. 1 shows the geometry of Implantable CPW-fed monopole hybrid antenna for resonant frequencies of 903MHz and 2.43GHz for dual band biomedical applications. The antenna is printed on a 28×33mm² FR4 substrate with thickness of 1.6 mm and relative