PROJECT: ECE 453

PRINTED DIPOLE ANTENNA DESIGN

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INTRODUCTION

Dipole Antenna is an antenna that can be made by a simple wire, with a center-fed driven element for transmitting or receiving radio frequency energy. It was invented by Heinrich Rudolph Hertz around 1886. One of the characteristics of these antennas is that the amplitude decreases uniformly from maximum to zero. These antennas are the simplest practical antennas from a theoretical point of view; the current amplitude on such an antenna decreases uniformly from maximum at the center to zero at the ends [6].

Printed Dipole antenna is usually implemented when a printed circuit board is in need of an antenna. To save cost and area, the antenna is implemented on the same board as the circuit. This kind of antenna is generally omnidirectional which means the transmission/reception is invariant of the direction. Printed dipole antennas are very popular because of their ease of fabrication and practically no additional cost when implemented on the same PCB as the primary circuitry. The antenna design is based on the double-sided flat dipole implementation. To get optimum performance from a printed dipole antenna, the length of the dipole needs to be approximately half the wavelength (0.47 λ). The calculation is shown below in equation (1). Some of the works show that if the ground plane of the printed dipole is extended similar to the corner reflector geometry of a traditional dipole an increase in gain can be obtained [3]. By using triangular instead of rectangular dipole arms, the bandwidth of the antenna can be increased [1]. In some cases, balancing a dipole antenna is required. Balancing refers to matching the impedance on both branches so that both dipoles have same impedance along their lengths and same impedance to ground and other circuits. Advantages of balanced line include good rejection of external noise [6]. Balanced and unbalanced lines can be interconnected using a transformer called a *balun*.