<u>TITLE</u>: A study of a microstrip feed discontinuity for omni-directional linear array antennas.

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In this paper we present the characteristics of a feed discontinuity encountered in the design of a high gain omni-directional antenna array for WLAN applications. The antenna is a microstrip equivalent of a coaxial cable traveling wave antenna made by interchanging the inner and the outer conductors of the coaxial cable at half wavelength intervals. In the microstrip equivalent of the coaxial antenna, the microstrip and the ground plane are switched from top to bottom of the substrate. The advantage in the microstrip realization is the flexibility available in terms of the control on the width of the ground plane as well as the micorstrip line impedance. We can also incorporate impedance transformers, phase shift elements, active circuits etc. on the antenna element.

To design such an antenna we need to accurately characterize the discontinuity encountered in flipping the microstrip and the ground plane sides at regular intervals. In this paper we have characterized one such discontinuity, and also the coupling between two discontinuities as a function of the spacing between them. The analysis of the discontinuity is carried out using a finite difference time domain (FDTD) formulation of the problem. The FDTD code is developed in house on a MATLAB platform.

The discontinuity is characterized in terms of a 2-port equivalent circuit parameters, and the variation of the parameters is studied as a function of the ground plane width as well as the discontinuity gap. A few discontinuities are fabricated in duroid substrate and the scattering parameters are measured using a vector network analyzer. The theoretical FDTD results show good agreement with the measurements.

In the linear array design it is essential to account for the mutual coupling among the radiators. This aspect is studied by evaluating the scattering parameters of two discontinuities as a function of the spacing between them.