Reconfigurable Circularly Polarized Dual-Band Stacked Microstrip Antenna

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There are several types of reconfigurable antennas. In this paper we concentrate on antennas that can change their beamwidths in real time. Furthermore, in some applications, such as GPS, there is a need for dual band circularly polarized antennas. A new design for a three-layer reconfigurable circularly polarized dual band staked microstrip antenna is proposed. Figure 1 depicts a cross section of the dual band microstrip antenna. The antenna consists of two staked patches in the bottom two layers and a ring on the top layer. Note that the antennas are probe-fed and $\varepsilon_1 = \varepsilon_2 > \varepsilon_3$.

The effective width of the parasitic ring surrounding the antenna can be changed in real time by activating switches (diodes, transistors or RF MEMS). Adjusting the width of the ring can then change the beamwidth of the radiated field. The switches, diodes in this case, are assumed to have two states of operation, namely, *on* and *off*. Ideally, the *on* state allows the current to flow through the switches, while the *off* state does not. The change in the beamwidth is larger with this scheme (more degrees of freedom) than a previous scheme presented by these authors (K. W. Lee, N. Surittikul and R.G. Rojas, IEEE-APS/URSI Symposium, June 2002).

This study is being accomplished by means of analysis, computer simulations and implementation of prototypes. 2D and 3D models are being developed to understand the behavior of this class of antennas. Numerical techniques such as the Method of Moments (MoM) and the Finite Difference Time Domain (FDTD) are used to obtain numerical results of the radiation pattern, input impedance, polarization properties, etc.

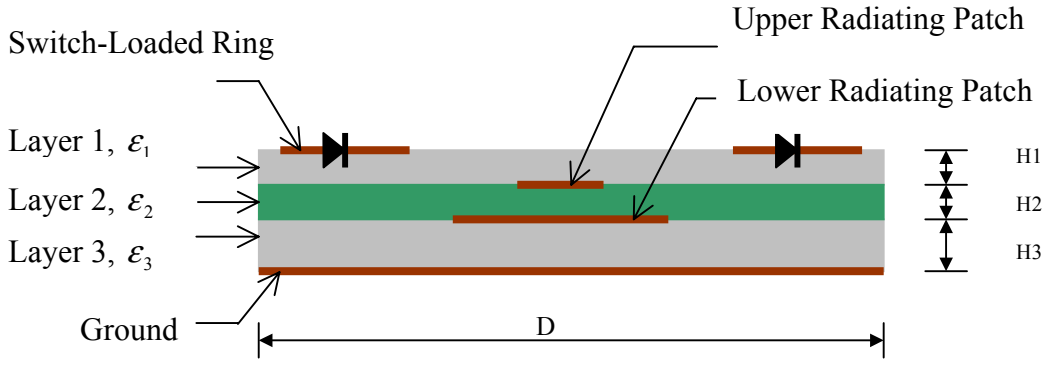

Figure 1: Cross Section of a Reconfigurable Dual Band Microstrip Antenna