

## Reconfigurable Planar Log Periodic Antenna

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Log periodic antennas have been around for many years and have been valued for their very broadband behavior. The self-complimentary toothed-planar version was one of the earliest log periodic antennas and has been explored much in broadband antenna literature. Here, we discuss methods of modifying this design so that its frequency band and polarization characteristics become reconfigurable. In order to allow room for modifications to the antenna geometry, the self-complimentary portion of the original antenna design was abandoned.

The central idea to the frequency reconfigurability modification is that by closing appropriately placed switches, the electrical lengths of all the teeth are halved. This doubles the frequency radiated by each tooth, and hence doubles the upper and lower band limits. The diodes require a biasing network which consists of narrow slots that extend a quarter-wavelength from the end of each tooth and then terminate into a large gap. To reconfigure the polarization, a copy of the original antenna pair must be rotated  $90^\circ$  and added to the substrate. Diodes at the feed structure then provide the ability to switch between the two antenna pairs. With the incorporation of a phase shifter into one of the feeds, the antenna now has capability to change between linear, dual and circularly polarized configurations.

Theoretical simulations in Ansoft Ensemble have been used to optimize a microstrip-fed planar log periodic slot antenna and the bias network it requires in the frequency-reconfigurable design. Diodes were modeled in Ensemble as thin strips of copper placed appropriately along the teeth, and the results showed that lower and upper limits of the bandwidth indeed doubled. A microstrip-fed antenna with diode biasing network has been built using a milling machine on a 62 mil Duroid substrate of dielectric constant 2.33, and measured results are favorable.

Design details, theoretical simulations, as well as experimental results for both the frequency-reconfigurable and polarization-reconfigurable designs will be presented at the conference.