

Multiband Fractal Antennas with Low Power Consumption

Shan-Yung Yang* and Jean-Fu Kiang

Department of Electrical Engineering and
Graduate Institute of Communication Engineering
National Taiwan University, Taipei, Taiwan, R.O.C.

In recent decades, due to fast evolution of VLSI technologies, wireless communication devices like Bluetooth, IEEE802.11 become more popular and reliable. However, due to the increasing data rate, power consumption becomes a serious problem. Fractal antennas can have many practical uses and their developments are just beginning. Fractals contain infinite detail, and are generally self-similar and independent of scale. In many cases, a fractal can be generated by repeating a pattern, typically in a recursive or iterative manner. These unique properties of fractals have been explored in order to develop a new class of antennas that are multiband and compact in size.

A set of parameters can be used to generate specific fractal geometry by applying the random iteration algorithm. This work relates the multiple resonant frequencies and the input resistance of fractal antennas to their equivalent size and the self-defined parameters of the fractal antenna geometry. The antenna characteristics have been experimentally verified. A systematic approach based on the self-defined parameters of fractal antennas is proposed to design multiband and multifunctional antennas using fractal geometries. A summary of the implementation of fractal antennas with low-power consumption and the comparison of different fractal antennas will also be presented.