

Adaptive multi-frequency reconfigurable antenna for wireless communication over fast fading channels

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ABSTRACT

Today wireless communication systems rely heavily on antenna technologies to function as optimally as expected. Thus an antenna system that operate in different frequency bands will definitely be a favorable choice. However, a tunable antenna operating a multiple discrete resonant frequencies is likely to have a complex Radio Frequency (RF) switching configuration table setup. Since reconfigurability is accomplished by using RF switches such as PIN diodes, which introduces a certain amount of radiation loss to the antenna in the switches ON-state, the number of switches utilized by the antenna in their ON-states to tune from one operating frequency to another determines not only the amount of insertions loss which the antenna experiences but also the overall performance efficiency of the antenna device. In this paper, the design of an antenna with efficient and low complex RF switching configuration setup for fast switching operation in fast fading wireless communication environment is presented. A ring resonators slot antenna fed by coplanar waveguide and loaded with six PIN diode switches constitute the fundamental structure of the antenna. The proposed antenna achieved more than ten discrete resonant frequencies with very good matching for all the frequency bands. Theoretical and experimental characteristics of the antenna showed a significant improved radiation pattern, efficiency, and impedance matching due to adaptively use of only one switch ON-state from the six PIN diode switches at any given time to tune from one operating frequency to another.

Keyword ; reconfigurable antenna, PIN diode switches, RF switches, switch configuration table, ring resonators, slot antenna, wireless communications.