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Analysis and design of reconfigurable multi-band stacked microstrip patch antennas (MSAs) for wireless applications

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Abstract: There is an increasing demand for smaller low-cost reconfigurable antennas that can be easily integrated with packaging structures. Reconfigurable Microstrip Patch Antennas (MSAs) received great attention in wireless communication systems due to their capability to vary their operating frequency, pattern and polarization. Reconfigurability enables us to accommodate more than one service using the same antenna. This thesis presents the analysis and design of new reconfigurable stacked (MSAs) of operating frequencies in the range of (2-5) GHz. The first new antenna is composed of two layers. The bottom layer is a MSA with two slots designed on each side that can be controlled via switches. By adjusting the statuses of the switches (that optimally fixed along the slots) we can vary the resonance frequencies, thus achieving frequency reconfigurability. In order to increase the number of resonance frequencies and to enhance the bandwidth and gain of the overall MSA, another patch is placed on top of the first antenna. The two patches are separated with a dielectric layer optimized to yield the maximum number of resonance frequencies, bandwidth and gain. The second antenna is the same as the first one but with switching top and bottom patches. Several results are included to verify the validity of the newly designed antennas.