

A Compact, Wideband Array of Coupled Quarter-wavelength Slot Antennas for the 700 MHz band

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In the United States, the UHF television broadcast switched from analog to digital in 2009. The spectrum efficiency of the digital broadcast has freed up about 108 MHz of bandwidth that is considered for wireless communication. This band is located between 698MHz to 806 MHz part of the spectrum and referred to as the 700 MHz band. Out of this spectrum, 70 MHz is allocated for commercial use, 34 MHz for public safety, and 4 MHz for guard band. It is expected that all mobile devices be capable of operating over the entire 700 MHz band. For this purpose, small antennas that can be incorporated into handheld devices are of interest. This poses a challenge to design small antennas that can provide the required bandwidth. It is also highly desirable to design such antennas to be compatible with PCB fabrication technology for cost requirements.

In this paper, a wideband antenna composed of an array of coupled quarter-wavelength slot antennas is considered. A $\lambda/4$ slot antenna with one end open circuited and the other short-circuited is fed by a microstrip feed line and used as the driving element. A number of $\lambda/4$ slot antennas are appropriately position around the driving element to achieve the required bandwidth. The entire structure is designed over a finite ground plane whose dimensions affect the resonant frequency and the bandwidth of the antenna. The location and the number of elements are determined from the current distribution on this ground plane. An advantage of this design is that active circuit components can be place on the top side of the substrate that supports the microstrip line so long as the slots are not covered or crossed by RF lines. The simulation and measured input impedance and radiation pattern of this antenna will be presented during the conference.