

Design and Measurements of Integrated Microstrip Log Periodic Antenna for Switched Narrowband and Ultra wideband Applications

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Abstract:

Recent developments in radio engineering have thrown several challenges to the antenna designers [1]. Some of these challenges are antenna miniaturization, simultaneous/switched multi-band operation of antenna, highly efficient, robust and reliable antenna, etc. One such development in radio engineering is the evolution of the concept of cognitive radio [2-4]. A cognitive radio is a wireless transponder that not only senses the operating environment but also adapts itself according to the prevailing environment for optimal operation. Such radio systems need an antenna that basically can search over a wide electromagnetic spectrum and also able to operate in a specific band depending on the application. Hence, there are significant antenna challenges in modern radio systems that need to be encountered with the current technology.

Microstrip antennas are very popular because of their small size and light weight. Due to the limitation of achieving narrow bandwidth these antennas cannot be used for wideband or ultra wideband (UWB) applications. This limitation can be overcome by enhancing the bandwidth using log periodic technique [5, 6].

In this paper, an attempt is made to design, fabricate and measure a log periodic antenna to operate both in the ultra wideband (UWB) and narrowband spectra. Primarily, a log periodic microstrip antenna is designed to operate as UWB antenna in the range of 3 GHz -8 GHz. Later, the same antenna is tailored to operate as narrowband antenna in the range of 300 MHz-2.5 GHz by switching the specific element in the log periodic array. The switching action is performed by controlling the power at the wave port/source of antenna. The design and simulations are performed using Ansoft HFSS software. The simulation results of antenna parameters such as return loss, Voltage standing wave ratio (VSWR) and the input impedance are compared with the measurement results.

Keywords: Log periodic antenna, ultra wide band, narrow band, micro strip and cognitive radio.

References

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