A Dual-Band Antenna Enabling Improved Quality of Service in Multi-Radio Wireless Sensor Applications in Indoor Environments

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Commercial products are pushing technological development towards all-in-one devices. Laptop computers, smart phones and other devices are able to provide services in a wide range of applications. The increasing number of services and applications sets new limitations to the engineering design. In particular, the continuing trend for miniaturization poses enormous challenges for antenna designers in realizing high performance and low cost antenna solutions. To that end, different technologies have been proposed with each having its advantages and disadvantages. Some of these solutions include Wide Band Antennas, Multiband Antennas and Reconfigurable Antennas, utilizing RF MEMS switches, PIN diodes, optical technologies, composite and exotic materials among others.

The rapidly emerging field of Wireless Sensor Networks (WSN) poses specific challenges for the antenna designer in applications that require reliable and high data-rate indoor wireless communications. These applications include wearable systems for biomedical and patient monitoring as well as building management which require improved quality-of-service (QoS), lower emission power, better propagation characteristics, better immunity to multipath and shadowing effects compared to existing wireless standards such as Zigbee that operates at 2.4GHz.

This work presents the design, simulation and measurement of a low cost, dual frequency antenna design that operates on both the lower 433 and 868 MHz ISM bands. This antenna allows radio access to two ISM-band wireless networks that enable improved QoS for indoor environments. The antenna structure can be fed with a microstrip line, a coplanar waveguide or even a coaxial cable. It is a planar, printed circuit implementation that can be easily integrated on the same circuit as the radio circuitry. This antenna has low return loss on both frequencies and dipole-like radiation patterns, making it an excellent candidate for applications such as wearable health-monitoring systems in hospitals and wireless sensor systems for building energy management.