

Wideband MIMO Antennas with High Isolation for Personal Communications

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Wideband antennas, incorporating multiple transmit and receive elements, can provide high data rates for indoor communications. However, designing multi-antenna systems with wideband (700 to 2700MHz) operation is very challenging because of concurrent requirements for high isolation among the collocated antennas, necessary for true MIMO performance. Further, indoor antenna systems have strict area-volume constraints, implying strong coupling among collocated antennas in a small volume. In this paper we present a pair of collocated antennas that achieve high isolation within a small volume. In addition to both operating from 700 to 2700MHz, they achieve high isolation by exploiting symmetry and polarization.

The proposed antenna pair consists of a center-fed, top loaded monopole for one of the radiators and a square ring aperture for the second radiator. The monopole antenna is mounted on a square ground plane (24cm per side) and consists of a bicone with a top loading plate and a set of shorting pins to control its operational frequency. The top plate is square in shape, 10cmx10cm in size, with the second antenna placed around it. This second antenna consists of a set of dipoles, strategically placed around the monopole to form a square ring. It is interesting to note that each of the 2 antennas serves to improve the bandwidth of the other due to their proximity.

Details of the antenna geometry and ensuing challenges to achieve strong isolation will be presented at the conference. We note that the monopole has a return loss of less than -10dB from 0.7GHz to at least 2.7GHz and an omnidirectional pattern. The 2nd antenna placed around the monopole has a return loss of less than -5dB from 700 to 1200MHz. Beyond this frequency, the return loss drops to -10dB up to at least 2.7GHz. Although good isolation can be achieved between the antenna pair, the outer (second) antenna is associated with pattern challenges due to its larger size at the higher frequencies. Solutions to addressing pattern uniformity over the entire band will be presented at the conference.