Abstract

Energy efficiency is a key factor that determines the lifetime of a MANET, and antennas play a vital role in achieving the successful transmission of information. Because nodes in a MANET are normally battery powered, antenna and transmission efficiency is paramount when transmitting information from a node to another. Historically, it has been shown that the use of directional antennas in wireless networks can conserve energy due to the skewed transmission towards a specific direction, and also help to resolve issues of interference from nodes in other directions. However, several concepts and algorithms have emerged that attempt to overcome the irregularities encountered in the use of directional antennas; especially from the design and implementation perspective. This work clearly demonstrates a vivid definition of an UWB MAC protocol for MANETs, and its behaviour when running different applications. It brings to light the valued significance in the implementation of an UWB MAC in a MANET and overcomes the main issues listed in a summary of existing work. The key aim of this research is to design an improved MAC protocol for UWB systems, in order to minimise power consumption in a MANET. Using a simulated environment modelled on the IEEE 802.15.3 standard, key system
design parameters for UWB MAC were identified and tested using directional antennas. As a result of this work, a proof of concept improvement via the modification of an existing MAC protocol based on the Ultra WideBand Concept for Ad Hoc Networks (UCAN) using directional antenna techniques is presented. The final results of the analysis clearly show that the proposed UWB MAC performs better when compared to existing MAC protocols.

References


**Index Terms**

Computer Science  
Communications

**Keywords**

MANET, UWB-MAC, Energy Efficiency, Directional Antenna