Abstract

A Mobile Ad-hoc Network (MANET) is characterized as a multi-hop infrastructure-less wireless network where the participating nodes may be mobile. MANET has been suggested for wide range of applications due to its feature of quick and easy deployment. Demand for broadband services in mobile environment has grown phenomenally in recent years. It is worthwhile to investigate appropriate issues in the Physical Layer (PHY), MAC and routing layers to examine feasibility of high data rate services in MANET.

Orthogonal Frequency Division Multiplexing (OFDM) is widely suggested as an efficient technique for supporting broadband services in a mobile environment due to its robustness to multipath fading. However one of the major drawbacks of OFDM is that it is highly sensitive to synchronization error [Pol '95]. So, we have suggested synchronization schemes for OFDM based WLAN and MB-OFDM UWB systems.

One of the most important reason for success of data networks in recent years is the systematic and layered approach to the design of DTE (Data Terminal Equipment) and other network elements. Layered architecture has worked well for wire-line networks. However, wireless medium is an unguided channel and radio transmission by one node may act as interference to other transmission. Further, a mobile wireless channel is a time varying channel due to interference, multipath fading and shadow fading. So, some inherent features of a MANET includes wireless link with fading, mobile nodes and decentralized control and hence it is argued that layered architecture may not perform well for MANET. A cross layer design approach exploiting the interdependence among protocol layers may achieve performance improvement in a MANET.

We have studied the effect of OFDM based PHY layer design on higher layers of MANET. Further, we have proposed cross layer design approach at MAC and routing layer based on the channel information.