Abstract
The performance of IEEE 802.11 with different network densities and protocol configurations is of interest, particularly in distributed coordination function (DCF) mode. A mathematical model for single hop network IEEE 802.11 protocol was introduced by Bianchi [1] to analytically derive the saturated throughput. The ultimate goal is to enhance the capacity of Ad-hoc network closer to the analytical values of this model. As an attempt, the Receiver Based Capacity Enhancement Algorithm using Cross-Layer Design Approach (RCECLD) is proposed which dynamically adapts the data rate. It uses Signal-to-Noise Ratio (SNR) values calculated by Physical layer and exported to Medium Access Control (MAC) layer via the cross-layer interface to estimate the prevailing channel state. In RCECLD the receiver decides the transmission data rate by calculating the SNR value of received RTS (Ready-to-Send), which is in turn an estimate of the prevailing channel state, and piggybacking it through CTS (Clear-to-Send) to the transmitter. Accordingly, transmitter transmits the data frame with adopted data rate.

The capacity of the Ad-hoc network is enhanced with RCECLD. It is investigated through an extensive set of single hop and multi-hop simulations. The results indicate that the enhancement is very close to analytical values for smaller network size and it is about 2.5 times more than Auto-Rate Fallback (ARF) [2], in spite of fading and mobility effects in case of single hop, whereas in case of multi-hop with a chain of nodes it is almost doubled.

Reference


Index Terms

Computer Science  Wireless

Key words

RCECLD  ARF

Ad-hoc Networks

Multi-hop Networks