Improving the Efficiency of Mobile Ad Hoc Network through Optimization of Inter-frame Space Values

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Mobile ad hoc networks (MANETs) are a type of network in which every device acts as a router, capable of both receiving and transmitting data. Due to the unique nature of their design, MANETs' efficiency decreases as the number of nodes increases. Previous studies have failed to address deficiencies in the base IEEE 802.11 standard. It was hypothesized that through the management of inter-frame space values, such as short inter-frame space (SIFS) and distributed inter-frame space (DIFS), the efficiency of MANETs, measured in terms of the percentage of packets dropped, could be improved. Although both SIFS and DIFS were tested for an impact on the efficiency of MANETs, only SIFS values were found to correlate with the efficiency of MANETs. Varying SIFS values caused the packet loss to vary from 0 to 60%. Next, a relationship between the SIFS values and different packet transmission intervals was recorded for later use in optimization. As the times between transmission increased, the optimal SIFS value also increased. An optimized network was created using these recorded SIFS values. Through this project, an optimization scheme for MANETs was found which decreased the median packet loss of the network from a control packet loss of 5% to a loss of 1%. Additionally, the relationship between SIFS values and transmission intervals provides a basis for a future optimization protocol, without the necessity of using previously tested SIFS values.

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