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International Journal of Energy Management in Ad Hoc Wireless Networks

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ABSTRACT

The nodes in an ad hoc wireless network are constrained by limited battery power for their operation. Energy Management is an important issue in such Ad hoc wireless networks. The use of multi-hop radio relaying requires a sufficient number of relaying nodes to maintain the network connectivity. Hence Battery power is a precious resource that must be used efficiently in order to avoid early termination of any node. This paper provides the Energy management deals with process of managing energy resources by means of controlling the battery discharge, adjusting the transmission power and scheduling of power sources so as to increase the lifetime of the nodes of an ad hoc wireless network.

Keyword: MANET, Energy Management , Battery Power.

I. INTRODUCTION

Energy Management deals with the process of managing energy resources by means of controlling the battery discharge adjusting the transmission power, and scheduling of power sources so as to increase the lifetime of the nodes of an ad hoc wireless network. Efficient battery management, transmission power management, and system power management are the three major means of increasing the life of a node. Battery management is concerned with problems that lie in the selection of battery technologies, finding the optimal capacity of the battery, and scheduling of batteries that increase the capacity. Transmission power management techniques attempt to find an optimum poer level for the nodes in the ad hoc wireless network system power management deals mainly with minimizing the power required by hardware peripherals of a node.

II. NEED FOR ENERGY MANAGEMENT IN AD HOC WIRELESS NETWORKS

The energy efficiency of a node is defined as the ratio of the amount of data delivered by the node to the total energy expended. Higher energy efficiency implies that a greater number of packets can be transmitted by the node with a given amount of energy reserve. The main reasons for energy management in ad hoc wireless networks are

Limited energy reserve: The main reason for the development of ad hoc wireless networks is to provide a communication infrastructure in environment where the setting up of a fixed infrastructure is impossible. Ad hoc wireless networks have very limited energy resources Advances in battery technologies have been negligible as compared to the recent advances that Have taken place in the field of mobile computing and communication.

Difficulties in replacing the batteries: Sometimes it becomes very difficult to replace or recharge the batteries. In situations such as battlefields this is almost impossible. Energy conservation is essential is such scenarios.

Lack of central coordination: The lack of a central coordinator, such as the base station in cellular networks introduces multi-hop routing and necessitates that some of the intermediate nodes act asw relay nodes. If the proportion of relay traffic is large. Then it may lead to a fasater depletion of power source for that node. Relay traffic plays an important role in ad hoc wireless networks.

Constraints on the battery souce: Batteries tend to increase the size and weight of a mobile node. Reducing the size of the battery results in less capacity which in turn, decrease the active lifespan of the node. Hence, in addition to reducing the size of the battery ,energy management techniques are necessary to utilize the battery in the best possible way.

Selection of optimal transmission power: The transmission power selected determines the reachability of the nodes. The consumption of battery charge increase with an increase in the transmission power. An optimal value for the transmission power decrease the interference among nodes, which in turn increase the number of simultaneous transmission.

Channel utilization: A reduction in the transmission power increases frequency reuse, which leads to better channel reuse. Power control becomes very important for CDMA-based systems in which the available bandwidth is shared among all the users. Power control is essential to maintain the required signal to interference ratio(SIR) at the receiver and to increase the channel reusability.

III. CLASSIFICATION OF ENERGY MANAGEMENT SCHEMES

Energy conservation can be implemented using techniques:

1. Battery management schemes
2. Transmission power management schemes
3. System power management schemes

Maximizing the life of an ad hoc wireless network requires an understanding of the capabilities and the limitations of energy sources of the nodes. A greater battery capacity leads to a longer lifetime of the nodes. Increasing the capacity of the batteries can be achieved by taking in to consideration either the internal characteristics of the battery (battery management) or by minimizing the activities that utilize the battery capacity (power management) diagram

IV. CONCLUSION

Energy management deals with the process of managing energy resources by means of controlling the battery management , adjusting the transmission power and scheduling of power source so as to increase the lifetime of the nodes of an ad hoc wireless network. Three management schemes increasing the life of a node. This paper provides to increase the lifetime of the mobile Efficient battery management transmission power management, and system power management of the nodes of an ad hoc wireless network.

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