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Review on Data Transmission on Power Conservative, Clustered and Fail Over Ad Hoc Network

Neetu, Ranjan Kumar Singh

M.Tech(pursuing), Dept. of Electronics & Communication Engineering, Shri. Ram College of Engineering and Management, Palwal, Haryana under the Affiliation of Maharshi Dayanand University at Rohtak, Haryana, India

Assistant Professor & HOD, Dept. of Electronics & Communication Engineering, Shri. Ram College of Engineering and Management, Palwal, Haryana under the Affiliation of Maharshi Dayanand University at Rohtak, Haryana, India

ABSTRACT: An ad hoc network features a assortment of mobile devices with no infrastructure the devices themselves form the infrastructure for communication between these devices. Each of the nodes in such a network could act as source, destination or a router for communication. The time in between battery recharging is a crucial characteristic of wireless communications devices as it is the measure of how truly wireless the device is. In an Ad Hoc network, this is the time for which the user can be truly independent of an infrastructure. Increasing this time by designing power efficient protocols has been a topic of active research for some time now. Power efficiency in ad hoc networks presents a unique set of problems, as each of the nodes in the network can be a source, destination and a router for the data traffic. This paper presents the existing research on power efficiency using conservative management along-with clustering and fail over in ad hoc networks, using wireless MAC protocol design and routing protocol design, in the scheme we proposed the scenario in which there is a cluster of mobile devices form ad-hoc network among them one or more device request for data over the node available on the ad-hoc network. Consequently one node will start delivering the data to the recipient in between if the host node is less with the power backup or battery or goes dose off due to insufficient power the next node from the cluster will act as host and will deliver the remaining data to the client. Subsequently, which ensures availability of the data to client thus ensuring that the power is conserved because the transmission is not stopped in between and only remaining of data is transmitted by the host node, not the from the beginning. However in the scheme we propose the hibernation aspect also in which, if the transmission is not going on the nodes in cluster will get hibernated.

KEYWORDS: Tethered Network 802.11, Cluster Network, Fail Over, Power Conservative, MAC, Destination sequenced distance vector routing, DSDV, Cluster-head gateway switch routing, CGSR, The Wireless routing protocol, WRP.

I. INTRODUCTION

Ad hoc networking has a wide variety of applications ranging from military applications to personal area networking. Each of these scenarios presents us with different energy requirements and different objectives in terms of energy conservation. These different objectives will lead to different designs at hardware, MAC and routing protocols. The objectives could be:

1. Availability of data to client node should be 100% guaranteed because without this factor the entire system is of no use (Fail Over aspect).
2. Cluster formation in the ad-hoc network
3. Nodes in cluster should get hibernated while the data transmission is not in exercise.
4. If master nodes mal-function while transmitting the data to client node, next subsequent master node from cluster will send the reaming of data to client node (Power Conservative or Power Efficient).

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5. Maximize the throughput of the network, i.e. maximize the lifetime of the nodes that are more likely to generate, receive or route data traffic.

Lot of research has been done in this area of energy conservation in ad hoc mobile networks. This paper will present a survey of such research. This paper is organized as follows: discusses the energy efficient routing protocols, presents energy efficient MAC protocol and summarizes the existing research from a complete networking solution perspective, also presents some of the problems that needs to solved and possible future research activity in this area.

Routing Protocols: An ad hoc network has a collection of mobile devices with no infrastructure; the devices themselves from the infrastructure for communication between these devices. Each of the nodes in such a network could act as source, destination or a router for communication. As each of these devices are mobile, the routing path used for communication between two nodes in the network will be changing constantly. Hence, the routing protocol used in such a network must be capable of adjusting to the constant change in the infrastructure and be able to re-route packets as the change occurs. A variety of routing protocols that are capable of doing just that has been proposed; these routing protocol fall in one of the following two categories [1]:

1. **Table driven and**
2. **Source initiated or demand-driver.**

As the name implies, in a table driven routing protocol each node maintains one or more routing tables and routes the data packet based on the information in these tables. This routing protocols will have to track the changing topology of the network by propagating any such change to all the nodes in order to maintain correct routing data. The following protocols are examples of table-driven routing protocols:

1. Destination sequenced distance vector routing, DSDV [12]
2. Cluster-head gateway switch routing, CGSR [13]
3. The Wireless routing protocol, WRP [14]

Each of these protocols defines methods for collecting and maintaining route information; and the metric used is almost always hop count with small variations. CGSR uses DSDV as the routing scheme with the difference that the routing is done through cluster-heads below diagram depicts the formation of cluster heads using piconet and furthermore scatternet enabling master slave and communication.

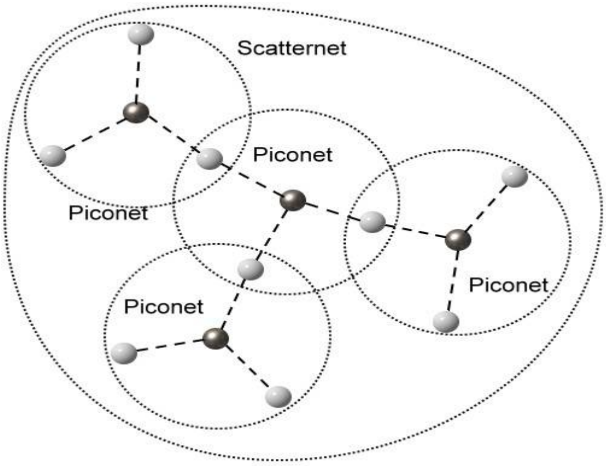

Figure 1 : Formation of Cluster-heads using piconet further more scatternet enabling master slave communication.

II. LITERATURE REVIEW

An ad hoc mobile network is a collection of mobile nodes that are dynamically and arbitrarily located in such a manner that the interconnections between nodes are capable of changing on a continual basis. In order to facilitate communication within the network, a routing protocol is used to discover routes between nodes. The primary goal of

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such an ad hoc network routing protocol is correct and efficient route establishment between a pair of nodes so that messages may be delivered in a timely manner. Route construction should be done with a minimum of overhead and bandwidth consumption. This article examines routing protocols for ad hoc networks and evaluates these protocols based on a given set of parameters. The article provides an overview of eight different protocols by presenting their characteristics and functionality, and then provides a comparison and discussion of their respective merits and drawbacks.[1]

In this paper, distributed power control is proposed as a means to improve the energy efficiency of routing algorithms in ad hoc networks. Each node in the network estimates the power necessary to reach its own neighbors, and this power estimate is used both for tuning the transmit power (thereby reducing interference and energy consumption) and as the link cost for minimum energy routing. With reference to classic routing algorithms, such as Dijkstra and Link State, as well as more recently proposed ad hoc routing schemes, such as AODV, we demonstrate by extensive simulations that in many cases of interest our scheme provides substantial transmit energy savings while introducing limited degradation in terms of throughput and delay.[2]

An ad-hoc network of wireless static nodes is considered as it arises in a rapidly deployed, sensor based, monitoring system. Information is generated in certain nodes and needs to reach a set of designated gateway nodes. Each node may adjust its power within a certain range that determines the set of possible one hop away neighbours. Traffic forwarding through multiple hops is employed when the intended destination is not within immediate reach. The nodes have limited initial amounts of energy that is consumed in different rates depending on the power level and the intended receiver. We propose algorithms to select the routes and the corresponding power levels such that the time until the batteries of the nodes drain-out is maximized. The algorithms are local and amenable to distributed implementation. When there is a single power level, the problem is reduced to a maximum flow problem with node capacities and the algorithms converge to the optimal solution. When there are multiple power levels then the achievable lifetime is close to the optimal (that is computed by linear programming) most of the time. It turns out that in order to maximize the lifetime, the traffic should be routed such that the energy consumption is balanced among the nodes in proportion to their energy.[3]

In this paper, we consider the problem of power control when nodes are non-homogeneously dispersed in space. In such situations, one seeks to employ per packet power control depending on the source and destination of the packet. This gives rise to a joint problem which involves not only power control but also clustering. We provide three solutions for joint clustering and power control. The first protocol, CLUSTERPOW, aims to increase the network capacity by increasing spatial reuse. We provide a simple and modular architecture to implement CLUSTERPOW at the network layer. The second, Tunnelled CLUSTERPOW, allows a finer optimization by using encapsulation, but we do not know of an efficient way to implement it. The last, MINPOW, whose basic idea is not new, provides an optimal routing solution with respect to the total power consumed in communication. Our contribution includes a clean implementation of MINPOW at the network layer without any physical layer support. We establish that all three protocols ensure that packets ultimately reach their intended destinations. We provide a software architectural framework for our implementation as a network layer protocol. The architecture works with any routing protocol, and can also be used to implement other power control schemes.[4]

III. PROPOSED WORK

To evaluate the performance of the proposed scheme, we develop a simulation model using below mentioned algorithm herewith conducted simulation study and will produce the desired results.

The following notations are used in this solution

D_i : end-to-end delay for secured route R_i

B_i : the route of bits per second through R_i

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t_s : the length of a time slot (i.e., 0.625 ms)

t_g : guard time for a bridge switching among ad-hoc

N_i^n : the number of nodes on route R_i

N_i^b : the number of bridges on route R_i

L : is the length of the packet size (2745bits)

e_m : the number of masters on the endpoints of R_i

We can calculate the end-to-end delay and the bandwidth by using Eq. (2) and Eq. (3).

$$D_i = \begin{cases} 2t_s\left(N_i^n - 1\right) + N_i^b\left(t_g + t_p\right), & for \quad 1 - slot \\ 4t_s\left(N_i^n - 1\right) + N_i^b\left(t_g + t_p\right), & for \quad 3 - slots \\ 6t_s\left(N_i^n - 1\right) + N_i^b\left(t_g + t_p\right), & for \quad 5 - slots \end{cases} \quad \text{Eq.(2)}$$

$$B_i = \begin{cases} \dfrac{L}{2t_s\left(N_i^n - 1\right) + N_i^b\left(t_g + t_p\right)}, & for \quad 1 - slot \\ \dfrac{3L}{4t_s\left(N_i^n - 1\right) + N_i^b\left(t_g + t_p\right)} & for \quad 3 - slots \\ \dfrac{5L}{6t_s\left(N_i^n - 1\right) + N_i^b\left(t_g + t_p\right)} & for \quad 5 - slots \end{cases} \quad \text{Eq.(3)}$$

Below diagram depicts the powers conservative ad-hoc network elaborating the routing techniques mention in above algorithm and flow of transmission under the clustered environment, which ensures availability of the data to client thus ensuring that the power is conserved because the transmission is not stopped in between and only remaining of data is transmitted by the host node, not the from the beginning figure 2 under is for ready reference.

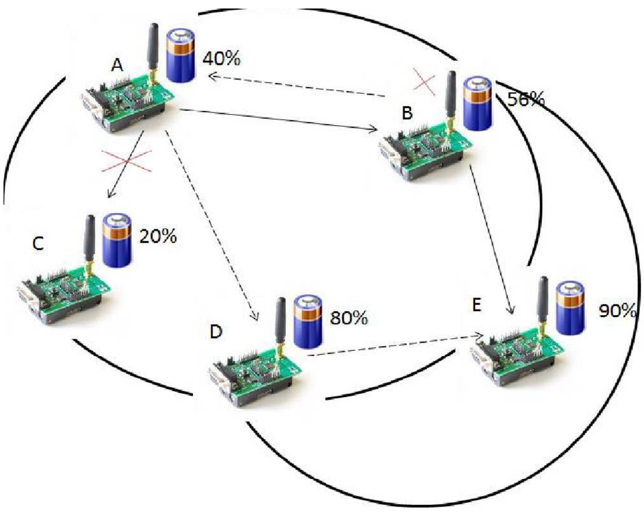

Figure. 2. Data Transmission on Power Conservative, Clustered and Fail Over Ad Hoc Network

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