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A SURVEY - ROUTING PROTOCOLS FOR ENERGY EFFICIENCY IN WIRELESS AD HOC NETWORKS

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Abstract- A mobile ad-hoc network is defined by limitations like the limited bandwidth, energy limitations in terms of processing capacity and memory. Additionally, MANET's must be able to operate under scalable conditions in certain applications. A routing protocol is crucial element of the design of these networks. In this paper, we examine the energy savings that proactive routing techniques such as DSR as well as AODV. Since DSR is an aggressive multipath source that relies on multipath sources cache routing protocol, it comes with certain advantages in terms of energy savings. AODV has a stronger and more durable protocol and we can enhance its energy conservation by incorporating energy saving cross-layer extensions i.e. SPAN. Therefore, we want to determine if energy-based extensions could contribute to the robust routing protocol by reducing power consumption of mobile nodes for better network resilience. Additionally, we study the energy efficiency of nodes in scalable environments and for various traffic patterns.

I. INTRODUCTION

Mobile ad-hoc networks (MANET's) comprise nodes that move in a random manner and create dynamic topologies. MANET's show characteristics like restricted bandwidth, energy limitations mobility, scalability, and security that is limited. Communication networks exhibit scale economies. In other words, the cost per user on the network decreases when the network grows in size, as measured by the number of users and host machines [22. The ability to scale wireless networks presents many issues. The majority of these issues are addressed by a routing protocol that is the main component in the design of ad-hoc networks. The principal objective of a routing system is the efficient establishment of routes between two nodes. Another important goal is to reduce the energy consumption of nodes to ensure the viability of networks since critical nodes could end their battery life

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and cease to be able to perform routing, leading to damaged links and negatively impacting the efficiency of routing protocols. While energy awareness is used as a component of routing protocols at the network layer it is equally crucial to enhance it by coordinating with other layers, such as MAC [3].

This paper will employ SPAN [5] which is a power saving device that lowers the energy consumption of nodes while keeping the capacity intact and co-coordinating with the underneath layer of MAC. On the network layer, we utilize DSR and AODV as well. AODV as well as the DSR protocol to compare. AODV is an example of reactive routing protocols is ideal for cases where the traffic diversity is high i.e. the number of active connections is greater and it is also an efficient protocol when contrasted with other protocols. It has been observed that AODV generally uses much more power than DSR. Therefore, in this paper we'd like to enhance the efficiency of energy conservation for AODV in conjunction into SPAN an interlayer technology for saving energy. We also want to evaluate the efficiency based on performance of AODV by using energy related metrics.

2. RELATED WORK

Routing is a method used to manage wireless networks where the the correct route was identified and then the route was followed and the route was also saved on the route table. For all types of routing the shortest path algorithm is utilized. Different types of routings are described below.

2.1. Energy efficiency proactive routing

Link-state algorithms are employed to create wired networks that utilize the table of routing. Every node there is a list of the next hop is created and for each destination, the complete number of hops is stored in the router for the successful sending packets. A proactive route driven by tables is utilized in wireless networks. Here, every node is able to transmit and receive up-to current routing information that is transferred to other nodes within the network. Every node is able to modify the routing table, and it transmits the newly conditioned table to the nearest nodes when there's a change to the network.

So, if a particular packet needs to be sent using a proactive routing protocol, that route already present and the table of routers can be used immediately and batteries are not often used to select routes from the many routes that are

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accessible. Some of the proactive routing protocols are Optimized Link State Routing (OLSR), Destination-Sequence Distance-Vector(DSDV), Wireless Routing Protocol(WRP) [7], [8].

2.2. Energy efficiency reactive routing

A routing protocol that can be reactive is known"on demand routing. Every node within the network sends it request of the routing to the nearest nodes. Then, that node will forward it's request to route the next closest nodes, and the procedure continues till it reaches the destination. If the destination node is notified of the request to connect, it issues an acknowledgement for the sending party. If the route connection has been established successfully the receiving node will receive every packet delivered to the sending party. Certain routes previously used are saved in the cache for the route and can be used when the same connection to the route is established. If there is a connection to a routes, they are maintained [77. On-demand routing is utilized to verify that the routes are in place and maintains the routes. When routing protocols like table-driven are evaluated, all nodes does not keep all of the information that was utilized prior to [88. The routing protocol cannot identify routes that are not required which means that less power is required and cost is reduced.

2.3. Energy efficiency hybrid routing

Hybrid routing protocol combines both reactive and proactive routing protocols. Reactive protocol will reduce delays in discovering routes that are in the routing table and control overhead traffic. Hybrid routing protocols include Zone Routing Protocol, Cluster Based Routing Protocol and CBR. [7].

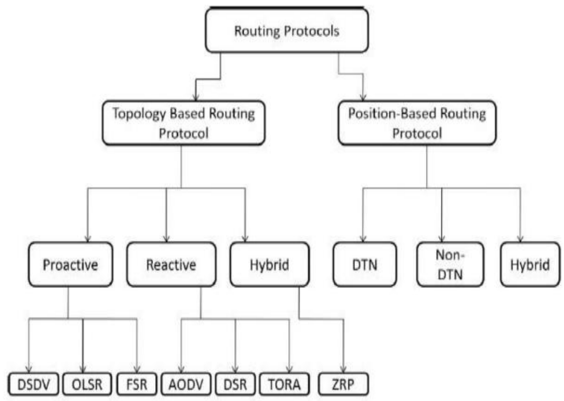

Fig 1 : : Types of routing

3. THE ROUTING PROTOCOLS

These routes allow packets to flow from one mobile node to another. After the connection has been established, the data packet will travel through all mobile nodes. There are many algorithms available to transfer data packets between mobile nodes. You can use it to be reactive, proactive, or hybrid.

3.1. Destination sequenced distance vector protocol

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Bellman-Ford algorithm can be used to find the shortest hops between the starting point and the end point by using destination sequenced distance-Vector protocol. The DSDV node stores the number of hops, destinations and sequence numbers as well as the next hop address.[12]

3.2. Optimized link state routing protocol

Optimized Link State Routing uses packet forwarding type in link states, which also includes a point-to-point protocol. This OLSR protocol allows for two ways to rearrange good like. This protocol reduces the size of control packets and decreases the number links. [7].

3.3 Wireless routing protocol

Wireless Routing Protocol is responsible for the distance vector path finding algorithms. WRP will also keep track of the next hops information as well as the previous hop information. From the accessible paths, you can find out the shortest path. Every node receives frequently amended data [7], [10].

3.4 Dynamic source routing protocol

There are two types of Dynamic source routing protocol that can be used to discover and maintain routes. These types can only be used when there is an in-demand. The routes that are not specific will lead to congestion across the entire mobile network [11]. Source routing determines which routes are required. If the route is maintained and cache storage are available, packets won't be lost [12].

3.5. Ad Hoc on demand distance vector protocol

The adhoc demand distance vector protocol is based upon distance vector routing. When there is a demand, and the maintenance table is completed, the routes for AODV protocol are found out.

4. ENERGY EFFICIENCY ROUTING PROTOCOLS FOR MANET

Mobile Ad hoc Networks can preserve energy by using energy efficiency techniques. The transmission of packets can lead to more collisions and high power consumption. This causes a terminal problem. They present an energy efficiency model for MANET that uses Energy-efficient Optimized link state routing (EE-OLSR). This protocol implements a new method for maintaining the path. The EE-OLSR energy model uses a progressive search to reduce routing overhead and path setup delay. It also increases the network lifetime and energy efficiency. The proposed energy models are compared to the EEOLSR model. EEOLSR model

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uses less energy when compared to the following: packet size, nodal speeds, grid size and packet inter-arrival times. It also has a lower average connection arrival rate.

Efficient Proactive Routing Protocol, a new and efficient protocol, is used to lower overhead and improve packet delivery rates for all mobile nodes. Comparing the new protocol with the old one, the author found that the link of transmission broke. This protocol can be used to reduce overhead. The nodes are selected where the signals are stronger. Multipath Route Discover Algorithm uses destination sequence distance vector algorithm to reduce overhead. It is tedious when multiple tunable protocols and issues of differing performance are combined. Protocol tuning techniques and the requirements of resource can improve energy efficiency. Energy can be increased in systems that have a sensor net. Multi-objective optimization is a new method that allows for different routing protocols to be optimized using different methods. First, a factorial design is used. Then, a statistical model is created. Space exploration can also be done using evolutionary algorithms and the Strength Pareto Evolutionary Algorithm.

Mobile ad-hoc networks have made mobile phones more intelligent with sensors that allow for easy movement and node drop. Because all mobile nodes are constantly moving, the power consumption of MANETs should be decreased. Each mobile node will remain active at all times. Therefore, communication energy must be increased without decreasing the battery life. To increase network life, reduce overhead and maintain the path, efficient power aware routing was developed. Even though there may be many changes to the network's topology, it must be minimized. The most important aspect of research in mobile ad-hoc networks is routing. This includes the throughput and delivery ratio for all mobile networks. The Efficient, Stable and Disjoint multipath routing protocol implements ondemand multipath routing protocols that reduce the interference. Split multipath routing protocol has a high delivery rate and high throughput. It manages the packet overhead using the provided router information. To improve throughput, the split multipath routing protocol uses the GloMoSim simulator.

Massive traffic requirements for ubiquitous access, as well as emerging multimedia applications, result in a

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significant increase in energy consumption of battery powered mobile devices. This assumption makes energy efficiency (EE), essential for mobile ad-hoc network (MANETs) (mobile ad-hoc networks), a necessity. This paper adapts EE optimization to MANETs based upon the cross-layer design paradigm. It is measured in bits per Joule. This problem is a non-convex mixed integer programming (MINLP), and we jointly consider routing, traffic scheduling and power control. Because the non convex MINLP is NP-hard, it is extremely difficult to global optimize. To efficiently solve this optimal problem, we devised a custom branch and bound (BB), algorithm. Our BB algorithm is unique in that it uses the characteristics of non-convex MINLP problems. Our proposed BB algorithm is more efficient than a reference algorithm which uses relaxation methods. We compare the results numerically with the reference algorithm. Our proposed BB algorithm scheme decreases the optimality gap by 81.98%, and gives rise to the best possible solution by 32.79% compared with the reference algorithm. These results provide insight into how to design EE maximization algorithms in MANETs. They also enhance cooperation between layers.

5. CONCLUSION

Protocol was not designed to make efficient use of battery energy. Although packets can be sent from one mobile node (or another) to another, power consumption cannot be reduced for every packet. In some areas, nodes cannot also adjust their transmission levels high or low. Each protocol can act in a different way in Mobile Ad-hoc networks. Performance of mobile nodes is dependent on various parameters. Otherwise, they behave differently. The bandwidth can affect the battery power. To reduce energy consumption by all mobile nodes within the network, a new protocol must be developed. A protocol that improves network lifespan should be created using efficient and good energy. This review will help researchers to create a new and more efficient protocol.

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