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Review Paper on Energy Efficient Routing Protocols in Mobile Ad-Hoc Network

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Abstract- *Mobile Ad-Hoc Network is a Self configuring Network, There is no in fracture for the all mobile devices which are belonging with the network, in this network each node communicate with other node directly or indirectly through the nodes. Thus, all nodes in a MANET basically functions as mobile routers participating in some routing protocol required for deciding and maintain the routes. Routing is one of the key issues in MANETs due to their highly dynamic and distributed nature. In particular, energy efficient routing may be the most important design criteria for MANETs, since mobile nodes will be powered by batteries with limited capacity. Power failure of a mobile node not only affects the node itself but also its ability to forward packets on behalf of others and thus the overall network lifetime. For this reason, many research efforts have been devoted to developing energy-aware routing protocols. A mobile node consumes its battery energy not only when it actively sends or receives packets, but also when it stays idle listening to the wireless medium for any possible communication requests from other nodes. Thus, energy-efficient routing protocols minimize either the active communication energy required to transmit and receive data packets or the energy during inactive periods. This review is based on the routing techniques that are based on the minimization of energy usage of individual nodes and many other ways. This review presents various power aware routing mechanisms proposed for wireless infrastructure-less networks. The main aim of the study of power aware protocol is to help the new researchers and application developers to explore an innovative idea for designing more efficient routing protocols.*

Keywords- *Destination-Sequenced Distance-Vector (DSDV), Wireless Routing Protocol (WRP), Optimized Link State Routing (OLSR), Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA) and Ad-Hoc On Demand Distance Vector (AODV), Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA) , Ad-Hoc On-Demand Distance Vector (AODV), Hazy Sighted Link State (HSLS), Cluster Based Routing Protocol (CBR) , Zone Routing Protocol (ZRP) etc.*

1. BACKGROUNG THEORY

In recent studies routing used for wireless adhoc networks was totally based on choosing appropriate route and then maintaining it. All these type of routing is fully dependent on shortest path algorithms. Types of routings are given in below Table1:

Table 1. Classification of Routing Protocol In MANET

Classification of Routing Protocol In MANET		
Proactive	Reactive	Hybrid
Destination-Sequence Distance-Vector routing (DSDV)	ABR – Associativity -Based Routing	ZRP (Zone Routing Protocol) ZRP uses IARP as pro-active and IERP as reactive component.
Optimized Link State Routing (OLSR).	Ad hoc On-demand Distance Vector(AODV)	ZHLS (Zone-based Hierarchical Link State Routing Protocol)
BABEL	Dynamic Source Routing	
Distance Routing Effect Algorithm for Mobility(DREAM)	Flow State in the Dynamic Source Routing	

2. PROACTIVE ALGORITHMS

This type of protocols maintains fresh lists of destinations and their routes by periodically distributing routing tables throughout the network. The main disadvantages of such algorithms are:

1. Respective amount of data for maintenance.
2. Slow reaction on restructuring and failures.

1. Destination-Sequence Distance-Vector routing (DSDV) :The main contribution of the algorithm was to solve the routing loop problem. Each entry in the routing table contains a sequence number, the sequence numbers are generally even if a link is present; else, an odd number is used. The number is generated by the destination, and the emitter needs to send out the next update with this number. Routing information is distributed between nodes by sending full dumps infrequently and smaller incremental updates more frequently.
2. Optimized Link State Routing Protocol: Individual nodes use this topology information to compute next hop destinations for all nodes in the network using shortest hop forwarding paths.
3. Babel : It operates on IPv4 and IPv6 networks. It has been reported to be a robust protocol and to have fast convergence properties. Babel is based on the ideas in Destination-Sequenced Distance Vector routing (DSDV), Ad hoc On-Demand Distance Vector Routing (AODV), and Cisco's Enhanced Interior Gateway Routing Protocol (EIGRP), but uses different techniques for loop avoidance.
4. DREAM is an ad hoc location-based routing protocol. DREAM stands for Distance Routing Effect Algorithm for Mobility.

3. REACTIVE ALGORITHMS

This type of protocol finds a route on demand by flooding the network with Route Request packets. The main disadvantages of such algorithms are:

1. High latency time in route finding.
2. Excessive flooding can lead to network clogging.

1. ABR is an on-demand routing protocol: Routes are created only as and when needed. This, in contrast, to the existing Internet where routes are immediately available and routing tables are constantly updated among routers. According to the publications,[3] on-demand routing is chosen because it can reduce the amount of control packet traffic and this is suitable for a wireless network because bandwidth is limited.
2. Ad hoc On-demand Distance Vector(AODV) :The Ad hoc On-Demand Distance Vector (AODV) routing protocol is intended for use by mobile nodes in an ad hoc network. It offersquick adaptation to dynamic link conditions, low processing and memory overhead, low network utilization, and determines unicast routes to destinations within the ad hoc network. It uses destination sequence numbers to ensure loop freedom at all times (even in the face of anomalous delivery of routing control messages), avoiding problems (such as "counting to infinity") associated with classical distance vector protocols.
3. Dynamic Source Routing : Determining source routes requires accumulating the address of each device between the source and destination during route discovery. The accumulated path information is cached by nodes processing the route discovery packets. The learned paths are used to route packets. To accomplish source routing, the routed packets contain the address of each device the packet will traverse. This may result in high overhead for long paths or large addresses, like IPv6. To avoid using source routing, DSR optionally defines a flow id option that allows packets to be forwarded on a hop-by-hop basis.
4. Flow State in the Dynamic Source Routing: DSRFLOW, the Flow-State extensions to Dynamic Source Routing (DSR), are a set of extensions that provide all of the benefits of source routing, without most of the per-packet overhead that is associated with source routing. It works by allowing most packets to be sent without a source route header, thus substantially reducing overhead. Indeed, one of the disadvantages of DSR was that the longer the source route of the packet was, the bigger the packet header became. The technique used is called implicit source routing.

4. HYBRID ALGORITHMS

This type of protocol combines the advantages of proactive and reactive routing. The routing is initially established with some proactively prospected routes and then serves the demand from additionally activated nodes through reactive flooding. The choice of one or the other method requires predetermination for typical cases. The main disadvantages of such algorithms are:

1. Advantage depends on number of other nodes activated.
2. Reaction to traffic demand depends on gradient of traffic volume.

1. Zone Routing Protocolor ZRP is a hybrid Wireless Networking routing protocol that uses both proactive and reactive routing protocols when sending information over the network. ZRP was designed to speed up delivery and reduce processing overhead by selecting the most efficient type of protocol to use throughout the route. If a packet's destination is in the same zone as the origin, the proactive protocol using an already stored routing table is used to deliver the packet immediately.

   If the route extends outside the packet's originating zone, a reactive protocol takes over to check each successive zone in the route to see whether the destination is inside that zone. This reduces the processing overhead for those routes. Once a zone is confirmed as containing the destination node, the proactive protocol, or stored route-listing table, is used to deliver the packet.

In this way packets with destinations within the same zone as the originating zone are delivered immediately using a stored routing table. Packets delivered to nodes outside the sending zone avoid the overhead of checking routing tables along the way by using the reactive protocol to check whether each zone encountered contains the destination node.

2. Zone-based hierarchical link state routing protocol with gateway flooding (ZHLS-GF) in which a new flooding scheme, called gateway flooding is proposed. ZHLS-GF is based on ZHLS, a zone-based hierarchical link state routing protocol. ZHLS is a hierarchical routing protocol for mobile ad hoc networks in which a network is divided into non-overlapping zones. All network nodes in ZHLS construct two routing tables, an intra zone routing table and an inter-zone routing table, by flooding Nodal SPs within the zone and Zone LSPs throughout the network. However, this incurs a large communication overhead in the network

4.1 ENERGY EFFICIENT ROUTING PROTOCOL

In adhoc network or any other wireless network battery power is major necessity. The technology friendly devices that operates on battery power helps to increase energy efficiently by decreasing the energy they consume, also maintains the performance as per expectance. Power consumption is not only the measure for energy efficiency. Energy efficiency can also be measured by noting the time for which network performs very well called as network lifetime. Sometimes when routes with lowest energy are followed .Through these routes more traffic can flow but it adversely affects all the nodes present in the network. These nodes get exhausted in very short time so in that case network cannot give good results due to failure of network nodes. For better energy efficiency power consumed by every node should be in balanced amount simultaneously network lifetime should be maximum so all the routes and nodes get balanced globally There are many types of routing algorithms. First is broadcasting. In broadcasting if any rout gets failed then it broadcasts message to other nodes so that new route get formulated simply. The second type is multicasting in routing protocols. During multicasting one group of nodes can communicate with multiple other groups of nodes. Last type is uni-cast routing in which only one to one communication take place. In wireless network nodes can be failed. It is hard to save energy while broadcasting as re-routing is required during node failure. During multicasting saving energy is same big challenge to achieve as in broadcasting. In uni-cast saving energy completely depends on status of link [10]. In adhoc networks energy is limiting value all other factors totally depends on energy. It is necessary to use energy in proper way. Nodes behavior depends on few characteristics they are: Firstly energy of nodes completely depends on battery with limited power supply. Secondly there is chance of failure in routes because nodes are mobile means that they can move without any central control. Thirdly bandwidth of wireless network is very limited in comparison to wired network. Bandwidth is not constant it varies time to time. Wireless network have very low bandwidth which adversely affect the network. Sometime above characteristics creates many problems like node failure, route failure etc in network. To get rid of above problems only one solution is possible that is to design energy efficient protocols. Making protocol energy efficient is mostly done in reactive protocols as they are more energy efficient than proactive protocols. The energy efficient protocols which are already introduced still have many drawbacks. Flooding in proper sense in reactive protocol can also help in achieving energy efficiency. If effective metrics such as cost, per node energy and battery level are used for route selection it will also save energy properly.

5. CONCLUSION

There is not any single protocol which can use battery power efficiently. Energy efficient protocols which are developed already lacks in some criteria like In some protocols overall transmission power consumed by every packet cannot be reduced and in some protocols nodes cannot adjust their transmission power levels. Different protocols behave differently in adhoc networks. Performance of the routing protocols varies on the basis of variation in network parameters like nodes are mobile they can move in uncontrolled way, their behavior also depends on the power supplied by battery and variation in low bandwidth. There should be some explicit protocol which can offer the most effective performance in each and every case topology. Therefore protocol with adjustable power levels per node, which will provide better network lifetime, is required. Protocol should be picked carefully which will be adapted in every topology and provides better energy efficiency. This review will help the researchers to pick good energy efficient protocol and also helps them to introduce new energy efficient protocol.

REFERANCE

1. Oswald Jumira & Sherali Zeadally, "Energy Efficiency in Wireless Networks", Wiley, 2013, pp x, ISBN 978-1-84821-444-6.

2. N. A. Pantazis, S. A. Nikolidakis and D. D. Vergados, "Energy-Efficient Routing Protocols in Wireless Sensor Networks: A Survey," in *IEEE Communications Surveys & Tutorials*, vol. 15, no. 2, pp. 551-591, Second Quarter 2013.

3. Nikolaos A. Pantazis, Dimitrios D. Vergados, "A Survey on Power Control Issues in Wireless Sensor Networks", *IEEE Communications Surveys*, vol. 9, no. 4, pp. 86-107, 2007.

4. I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci, "Wireless Sensor Networks: A Survey", *Computer Networks*, vol. 38, no. 4, pp. 399-422, 2002.

5. Al-Karaki A. Kamal, "Routing Techniques in Wireless Sensor networks: A Survey", *Security and Networks*, vol. 11, no. 6, pp. 6-28, 2004.

6 S. Guo, O. Yang, "Energy-Aware Multicasting in Wireless Ad hoc Networks: A Survey and Discussion", *Computer Communications Elsevier*, vol. 30, no. 9, pp. 2129-2148, 2007.

7 R.V. Biradar, V. C. Patil, S. R. Sawant, R. R. Mudholkar, "Classifiacation and Comparison of Routing Protocols in Wireless Sensor Networks", *Special Issue on Ubiquitous Computing Security Systems*, vol. 4, no. 2, pp. 704-711, 2009

8 S. Ehsan, B. Hamdaoui, "A Survey on Energy-Efficient Routing Techniques with QoS Assurances for Wireless Multimedia Sensor Networks", *IEEE Commun. Surveys Tuts.*, vol. 14, no. 2, pp. 265-278, 2011.

9 A. Basharat, N. Catbas, M. Shah, "A Framework for Intelligent Sensor Network with Video Camera for Structural Health Monitoring of Bridges", *Proc. 3rd IEEE International Conference on Pervasive Computing and Communications (PerCom)*, pp. 385-389, 2005.

10. J. Paek, K. Chintalapudi, R. Govindan, J. Caffrey, S. Masri, "A Wireless Sensor Network for Structural Health Monitoring: Performance and Experience", *Proc. 2nd IEEE Workshop on Embedded Networked Sensors EmNetS-II*, pp. 1-10, 2005.

