International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 04 | Apr-2016 www.irjet.net p-ISSN: 2395-0072

A Review on Energy Efficient AODV Routing Protocol

Priyanka Warwadekar[1], Prof. Kavita Mhatre[2]

[1]*PriyankaWarwadekar, Dept of Electronics and communication Engg., Usha Mittal Institute of Technology,Mumbai,India*
[2] *Prof. Kavita Mhatre, Dept of Electronics and communication Engg., Usha Mittal Institute of Technology,Mumbai,India*

Abstract - *Mobile Ad hoc Networks (MANET) is an autonomous collection of multi-hop wireless mobile nodes to establish communication without centralized infrastructure. Efficient routing protocol makes MANET reliable. Energy efficiency is a major problem of mobile Ad-hoc network as mobile nodes will be powered by batteries with limited capacity, insufficient source of energy and are difficult to replace or recharge. In MANET, Energy efficiency is an important challenge which leads to proposal of an Energy Efficient Enhanced AODV Routing Protocol that reduces delay, overhead, increases packet delivery ratio and consumes lesser energy compared to AODV. In this paper, a review of different protocols based on Energy Efficient Routing is done*

Key Words: MANET, Routing Protocol, AODV, Energy Efficient Routing.

1. INTRODUCTION

Computers and wireless communication has undergone a paradigm shift in recent years as a result mobile computing has evolved as prominent link field of computer communication. Wireless devices have evolved in terms of size, form factor and design hence they can be carried anywhere and can be used at any time. Due to mobile nature of wireless devices they have been trimmed down extensively, thus leaving very little space for battery pack. Biggest constrains of wireless devices therefore remains finite power supply. So the need of hour is efficient power management in wireless communication. Collection of wireless mobile host forms an ad hoc network which in turn form a temporary independent of any standalone infrastructure or centralized information. Fundamental challenge is constructing a MANET to enable each device with capability to continuously maintain the information required to route the traffic. Areas where primary concern of establishing and infrastructure based network are time lag and enlarged cost. MANET solves this primary concern. In continuous efforts of decreasing form factor and increasing the portability of mobile devices constraints like battery capacity and heat dissipation has arise which needs to be tackle through systematic energy efficiency program. Technology and research are improvising at steady but slower pace for enhancing the battery capacity and minimizing heat dissipation. The solution is energy efficiency which can be accomplished by doing work per unit of battery energy consumed and heat dissipated. Some of the challenges in MANET include Limited Bandwidth, Limiting power supply, Unicast routing, Multicast routing, Network overhead, Quality of service, Energy Efficient, Security, Battery constraints.

Characteristics of MANET

- Communication via wireless network
- Easy to Deploy
- Dynamic network topology
- Nodes perform roles of both hosts and routers
- Flexible
- No infrastructure needed
- Frequent routing updates
- Can be set up anywhere

Some of the applications of MANET are

- Defence Development
- Disaster relief operations
- Mine site operations
- Urgent business meetings

2. ROUTING PROTOCOL

In this section we study routing protocol which are of 3 types: Proactive, Reactive, Hybrid

2.1 Proactive Routing Protocol

These type of protocol are also called as Table-driven protocols. Basically proactive protocol are similar to connectionless datagram network. Maintains the routes at all time. Hence proactive protocol have lower latency. These protocols employs routing strategies

such as e.g. DSDV, OLSR routing and changes in link connection are updated periodically throughout the network. In this scheme, routing overheads is greater as routes needs to be defined before transferring packets but faster is packet forwarding. Advantages of these protocols is to find a route to its destination node, source node don't need to have any route discovery procedures whereas the main disadvantages is maintenance of unused paths which needs BW if the network topology changes frequently.

2.2 Reactive routing protocol

It is also called on demand routing. If there is no communication, protocols have no routing information at the network nodes. More efficient than proactive routing and recent work and modifications are done in this type of routing for making it better. The main idea behind this type of routing is to find route between source and destination whenever that route is needed whereas in proactive protocols we maintain routes without regarding its state of use. Hence in reactive protocols we don't need to bother about routes which are not being used currently. There are various types of on-demand protocols which are AODV, DSR, and TORA.

2.3 Hybrid routing

Hybrid protocols are the combination of reactive and proactive and as a result routes are found quickly in routing zone taking advantages of these protocols E.g. ZRP. These protocols works good for networks which have small no of nodes. AS the no. of nodes increases then hybrid protocols gives better performance. Reactive routing procedure is to be used at global network level whereas proactive routing procedure to be use in a nodes local neighborhood. Hence hybrid routing is a combination of proactive and reactive routing which performs better.

3. OVERVIEW OF AODV

In this section we study about Ad hoc On Demand Distance Vector (AODV) which is designed for use in MANET. AODV is based on distance vector routing algorithm. It is a reactive routing protocol i.e. it requests the routes when needed. This algorithm was motivated by the limited BW that is available in media used for wireless communications. It borrows most of the advantageous concepts from DSR and DSDV algorithms. Features of AODV routing protocol are loop free routing and notification to be sent to affected nodes or link breakage. AODV is capable of both unicast and multicast routing.

3.1Working of AODV

When a node requires to send packets to some destination, it will checks its routing table to decide if it has current route to destination. If Yes, forwards the packet to next hop node. If No, it initiates a route discovery process.

Rote Discovery

It will start with broadcasting of RREQ to its neighbors for certain destination. After receiving RREQ message from intermediate node, it checks its routing table for route to destination. If Yes, sends RREP to source. If No, it rebroadcast to its neighbor node. It will then set up a reverse path to source node in its route table. It ignores RREQ if it is processed already. Once RREQ reaches to destination node, it will unicast RREP to source node by using reverse route to source node [9].

Route Maintenance Stage

Broadcasting of active nodes is done periodically by hello message. As there is no hello message from neighbor up streams node notifies source with an RERR packet and entire node is invalidated. Initialization is done by source to a new route discovery stage. And then it will floods the RREQ packet [8].

3.2 There are 4 message in AODV

RREQ

It is used to initiate the route finding process. If route is not available for destination RREQ is flooded throughout the network.

RREP

It is used to finalize the routes only. If there is a valid route to the destination, it unicasts a reply message back to source.

RERR

In an active route RERR message are used to notify the network of link breakage. When 2 end points do not have valid active route then only AODV protocol is used.

The routing table field used by AODV are:

- Destination IP Address
- Destination Sequence no.
- Hop Count

- Active neighbors for this route
- Lifetime

3.3 Hello Message

By using Local broadcasts i.e. hello message node can get to know its neighborhood. Although AODV is reactive protocol, hello message are used to inform neighbors that the link is still alive. Hello message are broadcasted with TTL=1 and can be never forwarded. When hello message are received it refreshes lifetime of the information.

4. RELATED WORK

In this section, we study various Energy Efficient Routing Protocol which are proposed in the literature.

Various Protocols have been proposed for MANET. All of the MANET routing methods have advantages, disadvantages and scope for further research. The MANET routing methods in the papers we reviewed are based upon energy efficient routing protocol which is explained in this section.

The Authors of [1] classified Energy Consumption in 2 types: Active Communication where all node of the route participate in receiving and forwarding data packets and Inactive Communication, nodes are idle i.e. neither forwards nor receive any data packets.

The Authors of [2] proposed Energy Aware Routing Protocol for MANETS. In Transmission Power Control Approach, the transmission power increases, the transmission range also increases and so it reduces the no. of hop count to the destination. Topology is infrequent due to weaker transmission. Hence there is more high end to end delay and network partition. To avoid less power consumption, best transmission range between any pairs of nodes is required. Hence saves energy of battery, reduces interference and congestion in network and the main purpose of load distribution is to select underutilized node rather than shortest route. Due to proper load distribution among node, there is high balance in energy usage of nodes. In this approach nodes are prevented from being overloaded. It contribute longer network lifetime of the node.

The Authors [3] presented Maximum Energy Level Ad hoc Distance Vector (MELAODV). To increase the network lifetime and get efficient utilization of node energy is based on maximum remaining energy route in every node. Comparing energy consumption of 2 routing protocols: Ad hoc On Demand Distance Vector (AODV) and Maximum Energy Level AODV (MELAODV) resulted that data delivery ratio and network lifetime are better in MEL-AODV than AODV protocol. MELAODV increases lifetime of system and improves packet delivery ratio and also combines node energy on the link as route selection metric.

The Authors [4] proposed an Enhanced AODV Routing Protocol. By applying an energy mean value algorithm considering nodes energy awareness, improves network lifetime of MANET

The Authors of [5] proposed Energy efficient Maximum Lifetime Ad hoc Routing (EEMLAR) which provides energy efficient path for data transmission and maximize the lifetime of network and energy consumed is less compared to AODV. Energy is saved in the individual nodes by providing load balancing.

The Authors of [6] proposed Energy Efficient Path Routing (EEPR) Protocol which reduces the variance in residual energies of nodes and increase the network lifetime of MANET. Protocol selects a path based on Min-Max formulation for finding the residual energy path for reducing variance in energy consumption. Therefore network lifetime of MANET also increases. It also selects path that is most Energy Efficient and with highest stability and reliability.

The Authors of [7] propose an Energy Based Ad hoc On Demand Routing Algorithm that balances energy among nodes so that a minimum energy level is maintained among nodes, the life of network is increased and increasing extensive existence of node in the network. Energy sets at minimum threshold limit of a mobile node, reaches up to threshold limit then node goes to sleep mode and Saves energy. Thus increases the network lifetime.

The Authors of [10] presented performance improvement techniques of routing protocols where energy efficient routing protocol designs to improve the performance in terms of energy consumption, routing overhead, end to end delay and packet delivery ratio of the networks.

5. CONCLUSION

In this Paper, we studied different research papers on energy efficient routing protocol in MANET, to determine the route which reduces delay, overhead and consumes lesser energy. The greatest challenge in designing wireless ad hoc network is limited availability of energy resources and to overcome the problem of energy conservation there exist a lot of routing protocols. Performance varies according to variation in network parameters and network properties. So we will choose the protocol in such a way that which performs best for that particular type

of network. All these protocols have proved that they are better than the conventional AODV.

ACKNOWLEDGMENT

We would like to thank our honorable principal Dr. Sanjay Pawar of Usha Mittal Institute of Technology, Mumbai, India and Dr.Shikha Nema, Head of Department of Electronics and Communication Engineering for being a constant source of inspiration to us. We are also thankful to all the faculty and staff for providing the support and facilities to carry out our research and project work without which this would not have been possible.

REFERENCES

[1] Chang J-H Tassiulus L.," Energy Conserving Routing in Wireless Adhoc Networks", In proceeding of IEEE INFOCOM,March,2000,Pages 22-31.

[2] P.L Atha and R. Ramachandra,"Energy Reduction Aware Multicast Routing for Mobile Ad hoc Networks" In proc of Indian Journal of Science and Technology, Vol.3(3),PP.305-307,March 2010.

[3]P.S.Karaadge,Dr.S.V.Sankpal,"A Performance Comparison of Energy Efficient AODV Protocols in Mobile As hoc Networks", International Journal of Advanced Research in Computer and Communication Engineering Vol.2, issue1, January 2013.

[4] J.M Kim and J.W Jang, "AODV based Energy Efficient Routing Protocol for Maximum Lifetime in Manet", AICT-ICIW, PP.77, February 2006.

[5] Mrs.Shilpi Jain, Mr.Sourabh Jain", Energy Efficient Maximum Lifetime Ad hoc Routing", IRACST-IJCNWC, Vol.2, No.4, Aug 2012.

[6] Nisheeth Khanna and K Krishna NAik," An Energy Efficient Path Routing Protocol Based on AODV Routing protocol for Mobile Ad hoc Network," IJERT, Vol.4, Issue12, Dec-2015.

[7] Tripti Nema, "Energy Efficient Adaptive Routing Algorithm in MANET with Sleep Mode," International Journal of Advanced Computer Research (ISSN (print): 2249-7277 ISSN (online): 2277-7970), Vol.2, No-4, Issue-6, December-2012.

[8] Patil V.P," Efficient AODV Routing Protocol for MANET with Enhanced Packet Delivery Ratio and Minimized End to End Delay, International Journal of Scientific and Research Publications, Vol 2, Issue 8, August-2012.

[9] J. Moond, D. Singh and N. Choudhary, "Advancements in AODV Routing Protocol," in International Journal of Computer Applications-RAWCAI, 2014.

[10] J.Zhu and X.Wang, "Model and Protocol for Energy-Efficient Routing over Mobile Ad hoc Network,"IEEE TRANSACTIONS ON MOBILE COMPUTING, VOl.10, pp.1546-1557, Sep 2011.