A Survey on Reduction in Energy Consumption by Improved AODV on Mobile Ad Hoc Network

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Abstract— A MANET consists number of mobile devices form a network together without any centralized coordinator. In this network device changes location and organize itself, connected by wireless link. Ad hoc network is temporary plug in connection for a small session. Due to mobility of nodes or devices dynamically forming a momentary network. It doesn't have infrastructure because these are useful for temporary connection, so that there is a possibility of a lacking in a permanent source of energy, because the entire independent mobile device are entirely dependent on battery power. Energy consumption is one of the important factors in case of mobile node. Less amount of energy or lack of battery power is directly affect the life time of network. This paper is discussion improvement the lifetime of the path. In ad hoc network some of the energy efficient protocols are: AODV, OLSR, DSR, and DSDV.

Keywords— MANET, AODV, Energy, routing .

I. INTRODUCTION

Ad hoc network is one, in which there is no base station. So we can say that cell phone , can talk to on other cell phone, a computer can talk to on other computer or to many computer which can make a network for transferring data to each other . But through MANET only such computer or laptops can communicate which is not connected through a physical link.

The position of node can changing due to, they may not have direct link at different nodes. All of the nodes keep changing their location, so routing of nodes are dynamic. Routing is the selection of best path in the network. So we can say that the mobile ad hoc network which is self configuring, multi hope, dynamic momentary network without use of any centralized supervision.
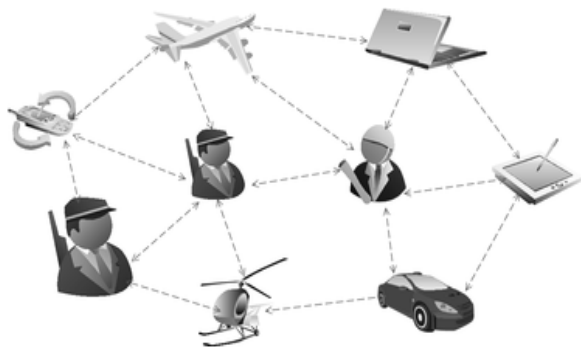

Fig:1 Mobile adhoc network

Mobile ad hoc network is established to share documents and files. This is one of the decentralized type of network, means it does not have any network infrastructure.

MANET consists of mobile platforms, known as nodes (MSs), which are free to move around arbitrarily very small device-based nodes, may be located inside airplanes, ships, trucks, cars and perhaps within the human body [1].

In this type of network, nodes are powered by battery resources, so maximizing the life time of battery of each node is an important issue. Generally the maximum energy of nodes is consumed in sending or receiving mode. In ideal or sleep mode minimum energy is consumed by nodes [2] various protocols developed in the MANET some of energy efficient protocol like AODV, DSR, DSDV, and AOMDV. In this paper we survey the performance modification and improvement of AODV protocol to decrease the energy consumption.

The remaining part of the paper is organized as follows:

The second section discusses ad hoc routing protocol in mobile ad hoc network. In section third we discusses different routing protocols for MANET. Here our fourth section is related works done in field of energy consumption. The fifth section is energy efficient routing for mobile ad hoc network. In section sixth we discusses the conclusion and future work. And the last section seventh presents our references.

II. AD HOC ROUTING PROTOCOL:

In mobile ad hoc network routing protocol is mainly classified in three ways:-

1. Proactive
2. Reactive
3. Hybrid

1. **Proactive:**

Proactive protocols also known as "table driven" protocols because it keeps all routing information in the table. In this method nodes regularly discover the path to all nodes for transferring data between them.

Each node has to maintain routing table at time to time. The routing entry of each node is tagged with the sequence number, which is created by destination node. Each node that broadcasts data will contain its sequence no. and for each new route, node contains the following information:-
- How many hopes are required to arrive that particular destination node .
- Generation of new sequence number marked by the destination.
- The destination address.[3]

Commonly used proactive protocols like:

1. DSDV (destination sequenced distance vector routing)
2. CGSR (cluster head gateway switch routing)
3. WRP (the wireless routing protocol)

2. **Reactive: -**

When node wants to transmit control packets only on demand and at that time route will be searched for destination, such type of nature is considerable for reactive protocols therefore it is also called "on demand". So it has low overhead because, the path for destination are determined on its demand.
There is no need to maintain any routing table. To find the route at each node flooding the route request (RREQ) packets all over the network.

 There are various types of reactive routing protocol:

- AODV(ad hoc on demand distance vector routing)
- DSR(dynamic source routing)
- TORA(Temporally –ordered routing algorithm)
- ABR(Associatively based routing)
- SSR(Signal stability routing)

3. **Hybrid routing protocol**:-
Hybrid routing protocol is a network routing protocol that combines the proactive and reactive protocol. It is used to determine optimal network destination routes and report network topology data modifications [4]. In this node movement is based on location.
      Examples of hybrid protocols include:
1. DZTR(dynamic zone topology routing protocol)
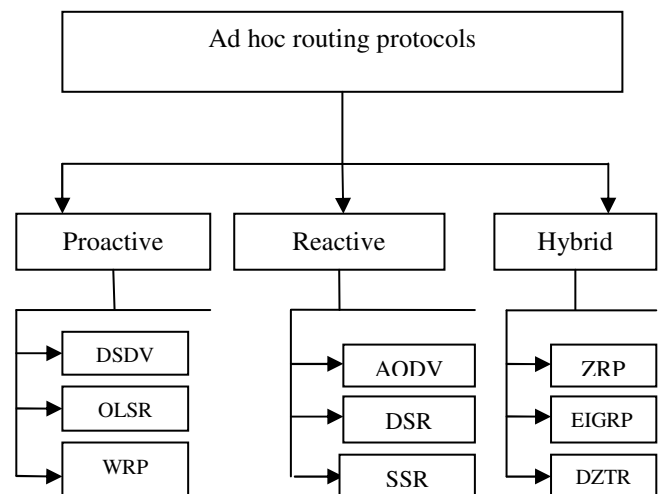2. ZRP (zone routing protocol).

Here figure show -

Fig: 2 The **Classification of Routing Algorithm** in MANET.

In this paper we survey that, how to implement AODV and DSR for reduction of batteries which is expected by nodes in the ad hoc network.

III. ROUTING PROTOCOLS FOR MANET

AODV and DSR routing protocols:-

These are the reactive routing protocol whenever any node wants to send some data to another node at that time node

will start searching for route. AODV and DSR both are the on demand reactive routing protocols. AODV is the extension of DSR. In case of DSR whenever any node find out a route to the destination the path will be include data itself, the data packet carries entire route.

In DSR for one destination there are multiple route possible, even node can use multiple route for the same destination.DSR is an on demand protocol designed to restrict the bandwidth consumed by control packets in ad hoc wireless network by eliminating the periodic table-update messages required in the table –driven approach[5].

In AODV, the routes are created when needed, so it is known as on demand. The route discovery mechanism is similar as DSR. In order to search a route first, it broadcast a RREQ packet and the destination receives the packet they will reply by sending RREP packet. AODV maintain all the routes in the form of table where as in DSR tables are not used. In AODV routing protocol when any entry made in the table it update and store information time to time.
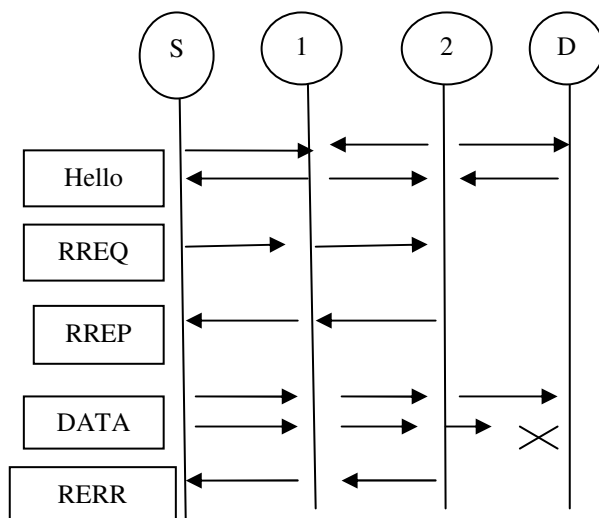

Fig: 3 AODV Protocol Messaging

Advantages of AODV:

1. AODV supports both unicast and multicast packet transmission for node.
2. It gives quick respond where topologies are changes due to movement of node, which effect the active route.
3. This is one of the very efficient routing protocols for mobile ad hoc network.

Disadvantages of AODV:

1. The broadcasting of data packet may reach such node that does not need them.
2. Lower reliability of data packet when deliver other nodes.
3. High overhead.

IV. RELATED WORK:

In this paper we survey that how to dropping energy consumption through the AODV protocol and how to improve it. At AODV protocol there are so many research paper proposed, for MANET. Here we get some related work and operations to improve efficiency and performance of AODV protocol.

In [6] Akhilesh tripathi and rakesh kumar et al. propose MECB-AODV: A Modified energy constrained based protocol for mobile ad hoc network. In this specifying an energy aware routing protocol based on the AODV concept and the extension of AODV is ECB – AODV and the extension of ECB- AODV is the MECB- AODV (modified energy constraint based AODV), that tries to decrease the cost of consumption of energy for any node in MANET.

In [7] Mrs. Sangeeta kurundkar et al. they presenting an improved AODV(I-AODV) protocol ,that introduces the stability factor which conserves and stabilizes energy among the nodes, and a delay reduction mechanism, which reduce the average end – to – end delay of the network. NS – 2 simulators is used to compare performances of AODV and I-AODV.

In [8] Nitiket N Mhala and N K Choudhari They proposed a research paper that is, An implementation possibilities for AODV routing protocol in real world by means of certain design possibilities and opportunities for obtaining needed AODV events. They discuss the socket based mechanism particularly when AODV routing daemon communicates changes to the table.

In [9] Keshav Nayak and Neelesh Gupta presents ,Energy Efficient Consumption based Performance of AODV, DSR and ZRP Routing protocol in MANET.

In this research, efforts are on methods to reduce the power consumption in communication between ad hoc networks nodes. They evaluate energy drain rate and energy cost per packet. This paper combine node lifetime and link lifetime which explore the dynamic nature of mobile nodes.

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In [10] Amit Singh, Nitin Mishra and Angad Singh group proposed the, Survey Of Location Aware Based Energy Efficient AODV Routing Protocols In MANET. In this paper they focus on location aware DREAM protocol which reduce the energy consumption, because due to the awareness of location less number of routing packets are flooded in the network.

In [11] P.S Karadge, Dr .S.V. Sankpal presents, A Performance Comparison of Energy Efficient AODV Protocols in Mobile Ad hoc Network. This paper describes improvement of the conventional routing protocol by utilizing high energy path in the network. They present a comparative analysis of existing AODV protocol and energy efficient AODV protocol which is modified to improve network lifetime as well as packet delivery ratio.

V. Energy Efficient Routing for MANET

Factors Affecting MANET:
- Scalability
- **Power** Vs latency
- Incompatible standards
- Data rates
- Security.

Our survey is to focus on reducing energy consumption between sending and receiving nodes in ad hoc networks, which also improve the Quality of service (Qos) that is error rates, bit rates, throughput, availability and transmission delay.

To increase the lifetime of network and minimizing the energy consumption of node we use the energy efficient routing algorithm. At present, the work done in average Reduction of Energy Consumption is 14.67 times with respect to basic AODV protocol.

Basically, energy consumption in mobile ad hoc network is in the three states of the node.
1. Transmission state,
2. Receiving state, and
3. Idle or sleeping state.

At the transmission state nodes transmits their information to the destination node, same as at receiving state the data or information received by receiver node and at the sleeping state is one of the highly energy consuming state, in this mode all the nodes are idle , neither transmits nor receive any data or signal. Even we can save more energy by keeping more nodes in sleep states. The energy consumption of node should be minimized not only during the transmission but also during sleep state to accomplish the network functioning goal [12].

In the mobile ad hoc network, the addition of route request packet with some variables such as size of information or data, unstable node count and buffered packets that will help for minimizing the energy of node. A particular single node can calculate its own residual battery energy. when the node broadcast the request packet to all over the network , if it contains more lifetime as required time , then the node that have less energy are prevented. The consumed lower energy of node is average energy consumption by other different routing protocols.

Remaining node of energy = Initial energy - Energy consumed

Average energy consumed = Percentage of energy consumed by all nodes / no. of nodes.

V.   CONCLUSION AND FUTURE WORK

In this paper, we try to survey the energy consumption issue in the ad hoc network. This is one of the important issues in mobile ad hoc network because all the devices are in the mobility mode. Even in this network energy is consumed in the terms of transmission mode, receiving mode, and idle mode.

We also include our analysis on improvement and modification in AODV protocol. The I- AODV routing protocol for MANET which efficiently reduce the energy consumption during the route discovery process. We have to achieve that, to increase the lifetime of path over the network. Energy consumption of nodes in the mobile ad hoc network can be reduced by decreasing the transmission power of nodes. This modification can further improve the existing protocol.

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