Energy Efficient Routing Protocol In Manet: A Survey

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Abstract— **Development of an efficient energy-aware routing protocol is the need of today's MANETs (Mobile Adhoc Networks). A lot of studies have been constant to expand energy conscious routing protocols (RP). RP describe a set of rules which control the flow of data packets since basis to target. Characteristic features of MANET make the routing procedure multifaceted; consequently the routing protocol is very significant for determining the network performance and its networking capacity. In this study we have considered concerning energy efficient AODV RP.**

Keywords— MANET, Routing Protocol, AODV, Energy Efficient .

I. INTRODUCTION

MANET is essentially collection of mobile nodes which are self-designing and can communication with each other. They establish & manage connection as required. Nodes in MANET are both terminal & router. Whenever a node wants to send data towards receiver, it act as a terminal, as a source or destination. At the same time, all inter-mediate nodes forwards the packets of other nodes, act as a router. So, these n/w's can be run by the operation of the end-users. Every one of the nodes are mobile with no centralized administration or control. These networks are dynamic in nature so that each node is free to join and leave the network. [1] Ad-Hoc n/w is a multiple hop wire-less n/w which subsits of autonomous mobile node inter-connected during wire-less channel. It doesn't have any fixed infrastructure and therefore is quick and easy to deploy in a situation where it's highly difficult to set up any fixed infrastructure networks. This has increased potential in critical scenarios such as battle fields and emergency disaster situations. Every& each node, participating in the n/w plays the responsibility of a router, during the communication. Nodes are operated by battery and since battery has a limited capacity and nodes' operation suffer due to severe battery consumption. The EE routing an imperative issue in MANET. It is the need of hour for the effective communication in MANET as in[2]

We need efficient and a stable path which could provide longer transmission that is necessary for the application where continuous data forwarding is required such as audio or video communication. MANET has mobile node which are densely or daintily sent in a sloppy example. The topology of MANET n/w ceaselessly changes in light of node arbitrary portability and this prompts visit connect detachment b/w imparting nodes. In MANET node mobility &fast energy exhaustion makes a testing issue in acquiring a dependable stable route for data transfer between source to destination. A stable route in MANET can be termed as route that last for a certain period of time during data transmission as in[3]

Fig.1 MANET

A. Attacks in MANET

Securing wireless ad-hoc n/w's is an extremely difficult issue. Considerate probable form of attacks is forever the first step to increasing exceptional safety explanation. Protection of declaration in MANET is considerable for safe statement of in sequence. Deficiency of any middle organization device and common wireless average create MANET more susceptible to digital/replicated attack than wired network near are an integer of attack that occupy MANET. This attack be able to be confidential as in the consecutive table [4]

Table 1: attack in MANET Security Layer

MANET security Layer	Attacks
Application Layer	Repudiation, Malicious code
Transport Layer	SYN Flooding, Session hijacking
Network Layer	Black Hole, Flooding, Grey Hole. Link Spoofing, Worm Hole etc.
Data Link Layer	Traffic analysis and monitoring.
Physical Layer	Eavesdropping, Traffic Jamming

Attack on MANET can be confidential into subsequent two categories: Passive and Active attacks.

Passive attack: in this category of attack, the interloper just plays out some sort of seeing on particular relationship with get information about the action without infusing any fake data. This sort of assault serves the assailant to pick up data and makes the impression of the attacked arrange keeping in mind the end goal to apply the attack effectively. In passive attack are eavesdrop, snooping, traffic analysis.

Active attack: in this attack, the intruder execute an effectual infringement on moreover the network assets or the data convey; this is done by global periodical on novel processor design and Their submission origin routing disturbance, network supply reduction, and node flouting. In the consequential is the category of active attack above MANET & how the attacker's danger can be execute. [5]

II. Routing Protocol in Manet

Routing is a task where one should send their data packets and their control to the chosen path of the network. These Ad-Hoc protocol controls how the nodes in the network decide which direction should be taken to route the packets b/w many devices in a mobile Ad-Hoc network, points don't begin out by being aware of the topology of their network; instead, they need build it overtime. The fundamental assumption is that at any point in time, a new point might declare its existence spontaneously and hence constantly listen for declaration broadcasted by its adjacent. Every point learns about its neighbor points and the distance/cost to pass them, and should also declare that it will pass them too. The routing method typically works on the process of forwarding packets based on the recorded information in the routing tables, which contain the routes of each n/w. Thus, creating routing tables, that reside within the router's reminder, is incredibly vital for effective, re-usable and cost-effective data exchange in the network. Given the mobile nature of the communicating nodes in the network adds to the complexity while designing a routing protocol. The available routing protocols can be categorized into proactive and reactive types, and some protocols merge the two into hybrid routing protocols.[6]

A. Routing Protocol-Proactive(Driven by tables)

This routing-protocol always requires keep-up their correct route entries in the tables. It attempts to ceaselessly appraise all of the routes information inside a network. This inferred the protocols to keep up a new and updated list of receiving and the corresponding routes to them by frequently distributing the routing table contents all over the network, and when a packet arrives at the point, the decision to onward the info to the next point can be made deterministically and instantly. Once the tables are setup, these information (packets) transmissions are quick and simple within the tradition cabled network. This is a very difficult task to create and maintain such routing tables in an Ad-Hoc mobile network. [7]

B. Routing Protocols- Reactive(On Demand)

These protocols are essentially need-driven, wherein the routing mechanism works on the basis of a request-reply message exchange. The establishing of a route to a receiving is only when there is a clear and specific need to do so, say when a source node's application layer is requesting to send some data to a remote receiving node in the Ad-Hoc network. They do not require a frequent exchange of topology information in the network. In a network where bandwidth is limited and power management is critical, the network control plane activity needs to be in silent mode when there is no actual traffic being routed. it's attention-grabbing to stay the network silent once there's no congestion to be routed. These protocols don't preserve their routes beforehand, instead they fabricate them on-desire. They do so by flooding the n/w with what are called the RR & RR messages.[8]

- Ad hoc On Demand Distance Vector

AODV is RRPs which make a route discovery process just while it need to send data packets to an extra near node and has no in sequence about the route to that exacting node. This is called the route discovery procedure in AODV which is "on-demand" i.e., route to destination is established only when it is essential. AODV create use of a route discovery algorithm which is complete in broadcast manner for discovery the route. AODV uses sequence information which are uphold at each destination node in order to establish originality of routing information and to stay away from any routing loops. These progression numbers are approved by every the routing packets. AODV makes use of conventional routing tables, one course passage for each goal that the node is communicating with it doesn't need to infrequently trade route data among the nearest nodes. In AODV, all nodes sustain a route table for the target node.[9]

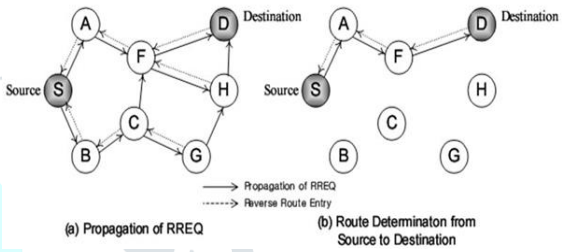

Fig. 2 Ad hoc On Demand Distance Vector

III. Energy Efficient COncepts In MANETS

A mobile ad hoc network efficiently as energy efficiency is important to establish route between source and destination for these applications. This goal can be achieved by reducing mobile node's energy during communication.

A. Type of communications

There are two types of communication

a) **Active communication:** once all the nodes of the route plays vital role in forwarding of data then that communication is named active communication. By using transmission power control and load distribution energy is minimize in active communication.

b) **Inactive Communication:** If all the nodes cannot participate in forwarding and receiving any data packets then that communication is named inactive communication.[10]

B. Approaches for reducing energy consumption

Subsequent are approaches exploit in reducing the energy consumption in active as well as inactive communication

a) **Transmission power Control Approach:** With increase in transmission power, transmission range also increases. If the transmission is weaker then there is high end to end delay .So for less control expenditure it is enviable to acquire exceptional trans-mission range b/w several nodes.

b) **Load Distribution Approach:** In this the under-utilized node resolves approach in play instead of the direct route. Because of the proper load distribution

among the node, there is high balance in energy usage of all nodes.

c) **Sleep power down Approach:** Inactive communication uses this type of approach. [11]

C. Energy Efficiency metrics

a) Total Transmission Energy: This is the whole of energy of the every the nodes method in route since basis to target.

b) Remaining energy capacity: This parameter shows the energy left in a node.

c) Energy consumed per packet: This metric is valuable for give the mini-mum power path with the support of the over-all energy utilization for deliver a packet is condensed. [12]

IV. Literature Review

Anjana Tiwari (2017), we proposed a new system base on obtainable AODV routing protocol without extrication of route subsequent to connection failure difficulty. This system does not reason link letdown difficulty and evade rebroadcast communication again from basis node. This provides a important development in node power. The reproduction result show that proposed method will improve the power of network. The comparison results between proposed AODV and obtainable AODV routing protocols are exposed in conditions of a variety of QoS parameter such as throughput, power tired, & PDR. This replica exertion is examine with NS-2 simulation tool [13]

Phonepadith Phoummavong et al [2017] in this paper, we focus on the problem of energy consuming in a MANET. Our research is the developed work based on "Greedy Forwarding with Classifying Inclusive Nodes based on Two-hop Information (GFCIN)" which has the same aim that can decrease energy utilization & increasing n/w life-time in location-aided MANET. To improve the performance of GFCIN, we proposed battery saving greedy forwarding method considering information of 3-hop away nodes over ad-hoc network inspired by geographic routing. Simulation outputs showed how our proposal can optimize the energy consumption in the mobile node and also have the best and stable performance in term of increasing lifetime compared with the existing methods. [14]

Dr. Debika Bhattacharyya et al [2018] in this paper we have seen that the energy degradation is a serious problem in MANET. So we have implemented a customized EEAODV RP which finds the optimal path b/w basis & target & decrease the energy utilization of the node in the n/w with improved performance. We have proposed to make AODV protocol energy – efficient by maintaining an E/D ratio and the reduction of packet size. [15]

Kishor B. Wane [2015] in this paper, we Energy Efficient Reliable Route Selection (RRS) scheme that aim to increase the energy efficiency and the network connectivity simultaneously. The proposed algorithm always selects the neighbor nodes have highest energy among all neighbor nodes. The intermediate nodes are easily exhausting their energy due to accepting and forwarding of data in dynamic network. The proposed scheme is utilized these nodes energy, by selecting them according to remaining maximum energy level section for utilizing energy of nodes for better lifetime. Sender has received the reply from each request and decided the remaining maximum energy node for data sending. The proposed EE system is develop the n/w concert as estimate to normal SP routing. The routing performance is evaluated through performance metrics like routing overhead, throughput and delay.[16]

R.Logambal et al [2016] in this work, the routing algo of HEEMCORP protocol have been establishing. HEEMCORP is a hierarchical energy efficient memory constrained on demand routing protocol. This hierarchical approach of having group leaders and territory leaders makes the routing effective and reduces latency in routing the packets. The hierarchical routing give improved PDR than DSR & MTPR. The hierarchical routing consumes less power than DSR and MTPR with the increase in number of nodes. [17]

Mohammed Aashkaar et al [2016] this investigation proposes an improvement in an AODV convention which is an overhaul in the current AODV protocol. The protocol figuring which is gotten by EE-AODV has redesigned the RREQ and RREP enchanting concern of procedure to additional the essentialness in mobile phones. In this work AODV protocol is implementing through by 30 nodes. The objective of this paper is to measure the efficiency of protocol at 30 nodes. The implementation capacities exploit for evaluation are release ratio, through-put, system life-time &normal energy inspired. The simulation will be done using NS2. [18]

Sasmita Mohapatra et al [2016] in this paper a new algorithm is introduced for routing in a Clustered Bee Ad Hoc network named as Improved Bee Ad Hoc-C. Now the routing is enhanced b/w cluster to cluster through the utilize of BCN (Border Cluster Node). The imitations have been approved & the consequences are established to be improved with respect to a standard Clustered Bee Ad Hoc n/w. The results are comparing with deference to dissimilar parameter like EE, End to End Delay, and Through-put, RDT, PDR, and Routing Over-head. All these parameters are measured with respect to different packet size. [19]

V. Conclusion

MANET is late pattern of novel communication technology. At the point when MANET totally grow then take care of parcel of issues however now daily MANET confront number of difficulties i.e. energy issue, security, mobility control, location prediction and radio range etc. Also in MANET, mobile node are re-source imperative devices implies it contain constrained vitality which causes restricted lifetime of n/w. In this paper we discussed, the concept related to energy efficiency i.e. type of communication, different approaches for minimizing energy and energy efficiency metrics.

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