International Journal of Advanced Information Science and Technology (IJAIST) ISSN: 2319:2682
Vol.4, No.2, February 2015 DOI:10.15693/ijaist/2015.v4i2.258-264

Enhancement Of Network Life Time Using Dtmaodv-Bp Based Multicast Routing Protocol

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***ABSTRACT*--An MAODV is an extension of AODV protocol. It's one of the efficient multicast tree structure. So many techniques are used to improve the performance of MAODV protocol such that performance like PDR, latency, power, throughput. In light load adhoc networks the multicast route recovery is effective. But, in high load network condition large number of packets discarded , poor robustness ,reduces network life time of the tree based protocols appears .Each node in an MANET operates on batteries, power consumption becomes an important factor and to maximize the lifetime of adhoc wireless networks the power consumption off rate and the network load has been evenly distributed into throught the network. The limited resources only available for mobile hosts so the routing schemes in MANETs present an important challenge. This paper presents a way to improve the lifetime of the network using power aware routing schemes and balancing the network load for constructing dual trees. The performance of system is evaluated by using the simulation tool NS-2. Finally the performance is compared with MAODV backup paths protocol.**

Index Terms:MANET, Multicast routing, Tree based ,power aware routing schemes, Backup paths.

I.INTRODUCTION

Mobile ad hoc network (MANET) is a self configuring network of mobile nodes connected by wireless links the union of which form an arbitrary topology**.** Needs a routing protocol which can handle changing topology MANET is a dynamically reconfigurable wireless network with no fixed infrastructure. Issues in designing routing protocols known as Mobility, Bandwidth constraint, Hidden and exposed terminal problems, Resource constraints**.**Bandwidth is the main concern to transmit the large amount of information over MANET**.** Each node act as a router and host, it moves in an arbitrary manner. The ad hoc network (MANET) is a self-configuring network of mobile nodes connected by wireless link, which is a full of electromagnetic and with a unstable structure.[1] In mobile ad hoc networks the nodes are not at all static. So the signal strength varies and the network may disconnect at any time during the transfer. A link that exists one moment may not exist at the next moment; because the link only exists when a node can be receive a sufficiently strong recognizable signal from its neighbor. The strength of the received signal depends on the following factors: Power of the transmitted signal, the antenna gain at the sender and receiver, the distance between the two nodes, the obstacle between them, and the number of different path the signals travel due to reflection. The each and every node in a multihop mobile ad hoc network must continuously monitor the radio signals it receives in order to determine the neighbors which composes a localized view of the network topology that uses the routing protocols. Routing is the process of establishing path and forwarding packets from source node to destination node. It consists of two steps route selection for various source-sink pairs and delivery of data packets to the correct destination .Objectives of MANET routing protocol are maximize the network throughput, maximize network lifetime and minimizes delay.

MTPR routing scheme Calculates total transmission power for all routes between S and D[7].It select the route with minimum total transmission power among all route to be the primary routing path.It selects the routes with more hops and the large number of nodes in route. Their routing paths are especially unstable if the selected route is via specific nodes, the battery of this nodes will be exhausted quickly. If several minimum total transmission power routes have a common host, the battery of this host will be exhausted very quickly**.**

Delay Sensitive Adaptive Routing Protocol(DSARP)traffic can be supplied and the route can be selected based on the constrained condition 1)Shortest route , 2) Lowest average delay[4]. It can be used on unicast routing protocol.When the network size is increased then delay is also increased, it can give lowest delay for small network only.

Reliable MAODV(RMAODV) reducing the number of route reconstructions and packet retransmissions[5]. It's used for stable routing support in MANET'S.It can be perform better than the MAODV protocol.If the mobility is

varied then it will give low packet delivery and Overhead ratio of the network is high.

Minimum Battery Cost Routing (MBCR)If all nodes have similar battery capacity, this scheme will then select a shorter-hop route[6]. However, since the "summation" of battery cost functions is considered, a route with nodes containing little remaining battery capacity may still be chosen.If any of the two possible routes between the source and destination nodes. Although node 3 has much lesser battery capacity than other nodes.The overall battery cost for route 1 is less than route 2**.** Hence, route 1 will be selected and that will reduce the lifetime of node 3, which is undesirable.

Min-Max Battery Cost Routing(MMBCR) inthis metric tries to avoid routes with nodeshaving the least battery capacity among all nodes in all possible routes, the battery of each host will be used more fairly as compared to previous schemes .Initially, it may seem that the lifetime of all nodes will be elongated. There is no guarantee that minimum total transmission power paths will be selected under all circumstances, it can still consume more power to transmit user traffic from a source to the destination. This actually reduces the lifetime of all nodes, which again is unattractive.

Parallel Multiple Nearly-Disjoint Trees Multicast (Parallel MNTMR) establishes two multicast trees to reduce data retransmission[10]. Parallel MNTMR splits the video into two parts and sends each part over a different tree. Parallel MNTMR first classifies all the nodes randomly into one of two groups based on uniform distribution.Then it can construct dual trees from nodes in two groups, respectively.Objective of this protocol is to maximize the Disjointness of two trees. In binary tree structure of proposed method using this concept.

Alternate Path Routing(APR) Alternate path routing balancing the load and end-to-end delay in MANETS[11].It provide load balancing and route protection by distributing traffic among set of diverse paths. It only considers on single channel systemsIn multiple channels APR candidate paths is limited.

Split Multipath Routing(SMR) SMR builds and maintains maximally disjoint paths to avoid network congestion. The source node adjusts traffic flow according to the total number of packets on each selected path.Providing multiple routes helps minimizing route recovery process and control message overhead. It distributes data packets into multiple paths of active sessions. This traffic distribution efficiently utilizes available network resources and prevents nodes of the route from being congested in heavily loaded traffic situations.

Above all papers there is no effective improvement on tree structure. To overcomesuch efficiency of tree structure we have only concentrates on When Power consumption can occur due to transmitting and receiving the data,data traffic and mobility. Power failure of node not only affects the node it also affects the forwarded packets and network lifetime.Power aware routing is a main consideration to minimize energy consumption while routing the traffic. It reduces total power consumption of all node involved in routing. Challenging goal is to provide power efficient routes because mobile nodes operation time is the main critical factor. Also, Enhancing the network life time the power on all the nodes to be considered and Forwarding data packets only on stable nodes. The battery power is used to eliminate the unstable nodes in order to achieve high reliability. It reduces number of retransmission on data packets .The node with low power does not selected as a member of multicast tree. It improves the route stability of multicast routing. The total power consumption can be decreased and the network lifetime can be prolonged.Balancing load on the network for constructing binary tree structure.

II.Related Work

In this section, three related multicast routing protocols, called MAODV, MAODV-BP and dual tree based MADOV-BP are introduced.

A.MAODV

Multicast ad hoc on-demand distance vector routing protocol (MAODV)protocol is used . It is the extension of the AODV protocol multicast, unicast, broadcast features have been streamlined into MAODV. It uses sequence numbers to ensure that the most recent route to the multicast group is used.MAODV is an extension of AODV (ad hoc on-demand distance vector) and maintenance a multicast tree structure. MAODV uses the multicast distribution mechanism of bidirectional shared tree , maintains and enhance multicast tree structure specialized in MANET scenarios. Two types of Tree structure are involved first one is source tree based and last one is share tree based. In source tree based the tree is shared between single S and R. In Share tree based the tree is shared between multiple S and R. Here shared tree based structure used on MAODV protocol.

Tree based routing protocols have only one link from source to destination ,and each link contains the least host during the communication.[1] If a node wants to join a multicast group or wants to send a message, then that node sends Route Request message(RREQ). Likewise if a member node wishes to terminate its group member ship, that node has to ask for the termination to the group then its membership will be terminated. Each multicast group has a unique address and a group sequence number. The group member that first constructs the tree is the group leader for that tree, which is responsible for maintaining the group tree by periodically broadcasting Group Hello message (GRPH) . Each node has three table.

1. Unicast route table
2. Multicast route table
3. Group leader table

Unicast route table has an address of the next hop to which the message is to be forwarded. Multicast route table has the address of next hop for the tree structure of the next hops for the tree structure of the each multicast group. The group leader table records the current multicast group addresses with its group leader address and the next hop

address towards that group leader receives a periodic GRPH message. Nodes in a tree structure are described as a downstream node or an upstream node. When a node leaves the multicast group, the tree structure needs pruning.

When a link breaks, the downstream node is responsible for repairing the breakage. Also the downstream node is responsible to send GRPH-U to every downstream node to indicate a new leader and to update the group information into multicast route table. The increased mobility in MAODV protocol causes frequent link breakages and data packet drops, link outages also generate repair messages, and increasing control overheads and minimizes the packet drops.

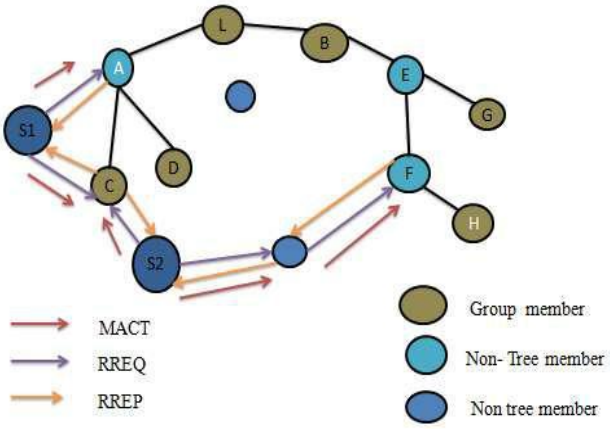

Figure 1. Impact of overload

During the overload condition the network performance of MAODV protocol has been decreased like PDR, throughput, latency. GMAODV-BP has been proposed to improving network performance for this condition.

B.MAODV-BP(BACKUP PATHS)

During the mobility in MAODV protocol link breakage has been occurred between nodes at that time so many packets will be dropped and it need the route reconstruction[1]. In MAODV protocol construct a multicast tree with backup paths. Each node has an backup paths for its tree member nodes and the information stored in its backup routing table. Backup paths are based on two aspects first Backup path(BP) selection and addition and second one is mechanism of multicast tree maintenance. In BP when an on-tree node firstly receives a GRPH message with the same multicast group leader address and multicast group address, it updates the multicast group information in its group leader table and multicast routing table.

Usually, the GRPH message is identified as the multicast group leader address and the multicast group address. We add one backup routing table for each on-tree node to save the information of its backup tree branch in MAODV-Backup paths. Various techniques are used to improve the performance of MAODV but they are doesn't consider about network load condition. In this technique consider the network load condition and it improves the performance of MAODV protocol.

In MAODV protocol PDR has been decreased in the network overload condition because large number of link repairs occurs between nodes. As the result for this condition so many packets has been dropped. In MAODV Backup paths combining the advantages of tree and mesh structure and it improves robustness of the MAODV protocol.Each group leader has an backup paths for its tree members nodes. If any tree node disjoint from its connection due to the mobility, at that time group leader gives alternate path for sending packets. It minimizes the number of RREQ,RREP messages send to the source node. It reduces routing overhead.

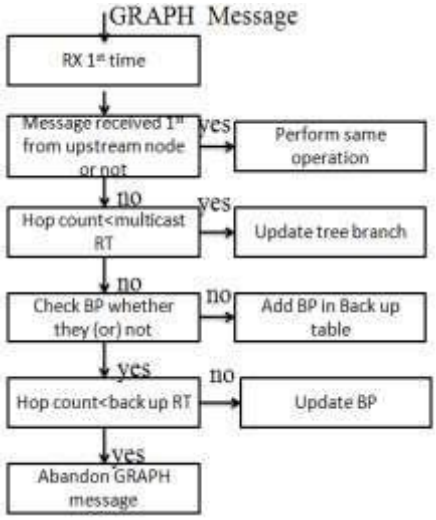

Figure 2. Backup Paths Selection and Addition

In tree maintenance phase it can be accomplished by means of an expanding ring search using the RREP, RREQ, MACT cycle.Downstream node is responsible for issuing a fresh RREQ for the group.RREQ can be answered only by member nodes member nodes.When a leaf node wishes to leave the group, it sends a prune message.Partition repair is facilitated by the GRPH message. When the upstream node detects the link broken, it will delete the downstream node in its next hop list and select pruning timer. If the downstream node detects the link broken, it needs to determine whether there is an available backup paths in its BP routing table. For maintenance the tree in multicast has so many advantages are involved in this performance such as MAODV integration of unicast and multicast into a unified framework reducing control overhead and free from loops.

C.DUAL TREE BASED MAODV-BP

Some issues (link repair, power consumption, reducing network life time, bandwidth constraint)has been involved in heavy load condition. In previous work concentrates on link repair condition based on MAODV-BP. Each group leader has an backup paths for its tree members nodes.If any tree node disjoint from its connection due to the mobility, at that time group leader gives alternate path for forwarding packets. It doesn't balance the load on the

network and the power metric also critical factor in load condition. So further work to improving MAODV protocol toBalancing load on the network for constructing binary tree structure and also Increasing lifetime of the network using power aware routing method.

In this method we can form the two types of nodes, such as group 0 and group1. This group will be formed based on the given threshold. From the source to neighboring nodes are all denoted as the downstream node. From the destination to the neighboring nodes are called as the upstream node.

To achieve the load balancing in the MANET we form the two trees from the source and destination.It divides multicast data packets into two parts and sends each part over a different tree. Multicast data packets are distributed transmission using Binary tree. The situation of data congestion can be decreased the load balance of data transmission.

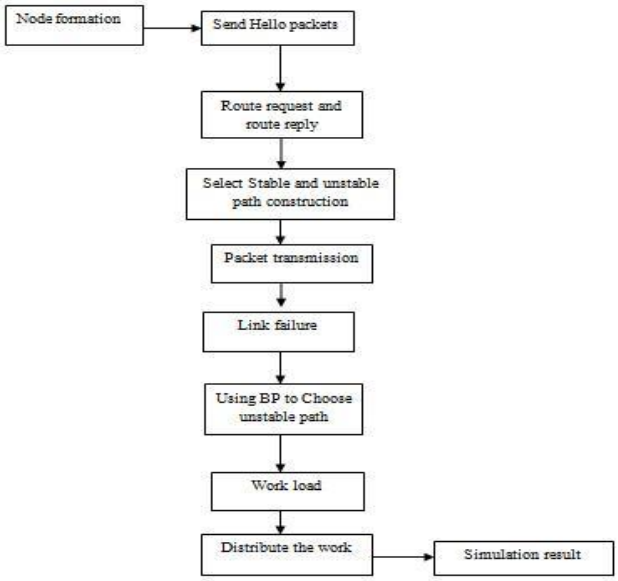

Figure 3. Processing Steps For DTMAODV-BP

The packets will be forward by the stable path. If suppose the stable path will failure we can select the alternate path form the routing table for that to use backup paths concept. Each node maintains the routing table and neighboring table. The neighboring node table was obtainedby the periodic broadcast of the hello packets. Each node recorded the information ofthe other node idand distance. The routing table contained which path is suitable for the data transmission. The routing table maintain the source id, destination id, sequence number, route class, next hop . We also concentrated the heavy load occurred in the mobile node. In this situation we can distribute the works among the neighbors node to balance the work load of MANET. We propose the DTMAODV-BP for MANET's; the distributed scheme is used to increase the lifetime of the network. We can construct the route discovery and route maintenance phase. We can reduce the number of the control overhead and number of reconstruct route. In our simulation result, we shows that our proposed algorithm was outperform the MAODV-BPwith respect to the packet delivery ratio and packet delivery delay. We also improve the network lifetime and balance the traffic load. This can be directly derived from the MAODV. In our proposed system provide the route maintenance, unicast dependency, minimize the control over head.

IIIPERFORMANCE EVALUATION

In this section the simulation environment is described and the simulation results are presented.

A.Simulation Environment

The simulation environment is created in NS2, a network simulator that provides support for simulating multihop wireless networks.NS2 uses object oriented Tcl (OTCL) as the front end and c++ as the backend tools. The simulation scenario is written using OTCL and it mainly considers routing protocol and traffic pattern as input. This simulation scenarios file generates trace file as output. The AWK scripts are used to extract the required values from trace file to calculate the desired parameters like PDR, delay, energy etc...,

The simulation experiment is carried out in Ubuntu is an operating system based on the Linux kernel and the Linux distribution Debian with Unity as its default desktop environment. It is distributed as free and open source software. The detailed simulation model is based on network simulator 2 (ver-2.26), is used in the evaluation. The mobility model uses the random waypoint model in a rectangular field. The field configurations used is: 1500 m × 300 m field with 50 nodes. Here, each packet starts its journey from a random location to a random destination with a randomly chosen speed. Mobility models were created for the simulations using 50 nodes, with no mobility, 1m/s, and maximum speed of 10 m/s, topology boundary of 1500 × 300.

We run simulations with NS2 to analyze and compare the performance of the MAODV-BP and DTMAODV-BP. Each sender sends 2 multicast data packets per second with each packet 256 bytes long; only multicast traffic exists in the simulation.

The parameters used in the simulations are listed in Table1. Our simulation settings and parameters are summarized in table 1.

Parameters	Values
Examined protocol	MAODV-BP,DTMAODV-BP
Simulation Area	1500m x 300m
Number of nodes	50
Mobility Speed	1-10ms
Mobility model	Random waypoint model
Node transmission range	150m
Data Packet Size	256bytes

B. simulation Results

The goal of our simulation is to analyze the behavior of the MAODV using Backup paths. To test the performance of DTMAODV--BP have implemented the MAODV protocol using simulation tool NS2.

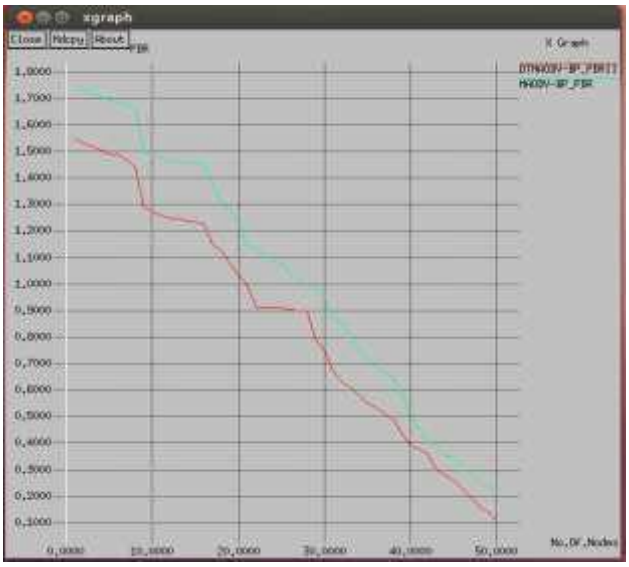

Figure 4.PDR Performance comparison of DTMAODV-BP AND MADOV-BP

Figure 5.Delay Performance comparison of DTMAODV-BP AND MADOV-BP

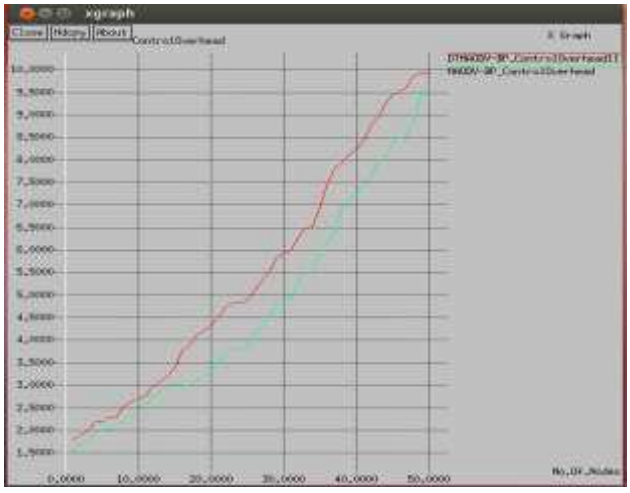

Figure 6.Control overhead Performance comparison of DTMAODV-BP AND MADOV-BP

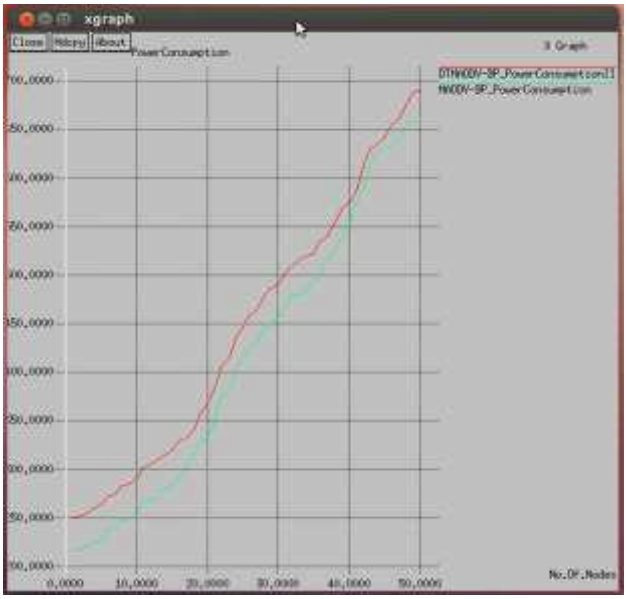

Figure 7.Power consumption Performance comparison of DTMAODV-BP AND MADOV-BP

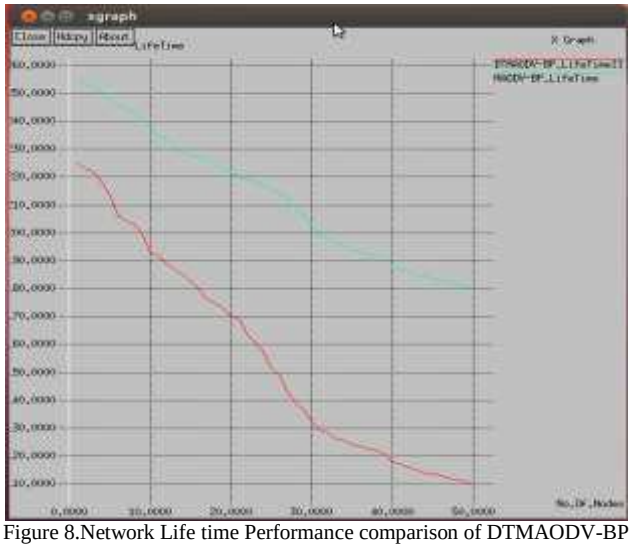

Figure 8.Network Life time Performance comparison of DTMAODV-BP AND MADOV-BP

VI CONCLUSIONS

Many of the proposed multicast routing protocols have been simulated using ns2. Because of the data forwarding problem, such metrics as throughput, end-to-end delay and the percentage of received packets are difficult to measure. In order to improve the packet delivery ratio, network life time and to decrease the latency, power consumption ,control overhead MAODV protocol and balanced the heavy load in the network.An DTMAODV-BP based on MAODV, which improves robustness of the MAODV protocol by combining advantages of the tree structure with the mesh structure. DTMAODV-BP protocol improves the network performance over conventional MAODV in heavy load ad hoc networks, which meets QOS requirements for communication in a MANET.As further work, intend to study the reliability of tree-based multicast routing protocols in varying conditions such as node mobility, group size.

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