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RESEARCH ARTICLE

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ADAPTIVE EVENT TIME DRIVEN SCHEDULING BASED ROUTING FOR MANET

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ABSTRACT

In MANET, the nodes are randomly moveable and network topology dynamically changed over time and data forwarding is difficult task in mobile ad hoc network. The proactive routing protocols update routing information frequently or particular time period. It will lead to increase routing overhead. In existing system, the Lightweight Proactive Routing protocol (LPSR) maintains more topology information and it provide source routing. Lightweight Proactive Source Routing has smallest overhead when it compared to destination sequence distance vector protocols, optimized link state routing protocol and dynamic source routing protocol. Lightweight Proactive Source routing protocol updates the routing information within particular time interval by using hello message. It leads to increase overhead and also increase frequent routing update. To overcome this problem in proposed system introduce adaptive event-time driven scheduling method to reduce routing update in routing protocol and also it reduce routing overhead in protocol.

Keyword: MANET, Proactive, Routing Protocol, LPSR, DSDV, DSR, OLSR, Event Driven, Time Driven

I. INTRODUCTION

A Mobile Ad-hoc Network is a type ad hoc network and it has collection of wireless mobile node. The network topology dynamically changes due to randomly movable from one place to another place without any help of predefined infrastructure or centralized administration. Mobile Ad-hoc Networks (MANETs) are collections of self-organizing and self-configuring multi hop wireless networks, where the structure of the network changes dynamically. The node in the network acts as a router that route data to and from other nodes in the network. All devices in a MANET are free to move in any direction independently, and because of this change its links to other devices frequently. Designing a routing for MANET has been a challenging task due to dynamic topology of the network. The frequent change in network topology creates the high degree of node mobility. A variety of protocols have been developed for the achievement of this task. Routing is the process of selecting paths in a network to transmit data packets from source node to destination node in the network.

In mobile ad hoc network many routing protocol implemented for better data transmission

between nodes and also find routing path between nodes. Mobile ad hoc network routing protocols are categorized into three major type.

(1) Proactive or Table Driven

(2) Reactive or On Demand

(3) Hybrid.

The routing protocol classified based on the data delivery structure of each routing protocol. The proactive routing protocols route to destinations are determined when a node joins the network or changes its location, and are maintained by periodic route updates. In reactive routing protocols routes are discovered when needed and expire after a certain period of time. Hybrid routing protocols combine the features of both proactive and reactive routing protocols to scale well with network size and node density in the network.

In this paper select the three baseline protocol for compare the performance of lightweight proactive source routing protocol and baseline protocol. The baseline protocols are destination sequence distance vector (DSDV), optimized link state routing (OLSR), dynamic source routing (DSR). The reason for selected these baseline protocols are, DSDV routing protocol estimate the distance from one node to another node via neighbor, OLSR routing protocol maintain complete topological information for each node in mobile ad hoc network, DSR routing protocol is provide source routing and it does not require other node to maintain forwarding lookup table. The DSDV, OLSR are proactive routing protocol and DSR is reactive routing protocol.

II. RELATED WORK

Z. Wang, Y. Chen, and C. Li proposed CORMAN: A Novel Cooperative Opportunistic Routing Scheme in Mobile Ad Hoc Networks. CORMAN focus on problem of opportunistic data transfer in mobile ad hoc networks and it provide solution is called Cooperative Opportunistic Routing in Mobile Ad hoc Networks (CORMAN). Opportunistic data transfer means if primary path fail then node alternatively choose another path. CORMAN perform two functions. CORMAN has three important challenges. The first one is overhead in route calculation. Second one is forwarder list adaptation. Third one is robustness against link quality variation. Nodes use a lightweight proactive source routing protocol to determine a list of intermediate nodes that the data packets should follow entire route to the destination. [1]

Jian Zhang a, Yuanzhu Peter Chen b, Ivan proposed MAC-layer proactive mixing for network coding in multi-hop wireless networks. A new MAC layer mixing method was proposed, named as BEND protocol. The goal of creating more network coding opportunities with a low overhead BEND protocol provides coding opportunistic in wireless network. This method does not use fixed relay forwards, BEND allows each node in the neighborhood to be a coder and forwarder and coordinates their packet transmission to next neighbor nodes. The BEND is to create more coding chances via proactive traffic mixing. The packets are queued at a neighborhood of forwarders as collectively manner in distributed packet repository. BEND consistently achieves higher throughput support than without proactive traffic mixing. The implementation of BEND makes use of packet redundancy for the encoding aspect. That is, any intermediate node in the neighborhood can encode and forward packets. BEND can be further extended to use packet redundancy for the decoding aspect. In this case, after a node receives a coded packet, if it cannot decode for the non-coded packet intended for it due to some earlier transmission errors, any of its neighbors could decode the packet alternatively and pass the non-coded packet further on to the next hop. [16]

Meenakshi Sharma, Navdeep Kaur, Gurjeevan Singh proposed Network Traffic based assessment of reactive, proactive and hybrid MANET Protocols. ExOR (Extremely Opportunistic Routing) is a widely used routing protocol in opportunistic networks. It improves routing performance by utilizing opportunistically success over unstable long-range links. The protocol called GExOR (Geographic Extremely Opportunistic Routing) is a combination of routing protocol and media access control for a wireless ad hoc network. The source node broadcasts the packet. Each node can determine its own location and that the source is aware of the location of the destination. The location information message can be routed to the destination without knowledge of the network topology or a prior route discovery. It discovers the routes towards destination. While discovering the

routes it also searches for the node which is closer towards destination. The forwarding-based scheme is used. RSA algorithm is provided security for Geographic Extremely Opportunistic Routing protocol in mobile ad hoc network. [5]

D. B. Johnson, Y. C. Hu, and D. A. Maltz, proposed On the Dynamic Source Routing Protocol (DSR) for mobile ad hoc networks for IPv4. The Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed specifically for use in multi-hop wireless ad hoc networks of mobile nodes. In Dynamic Source Routing, Route Discovery and Route Maintenance each operate entirely "on demand". Dynamic Source Routing requires no periodic routing update packets within the network. For example, Dynamic Source Routing does not use any periodic routing update information, link status sensing, or neighbor detection packets and does not rely on these functions from any underlying protocols in the network. [6]

III. system design

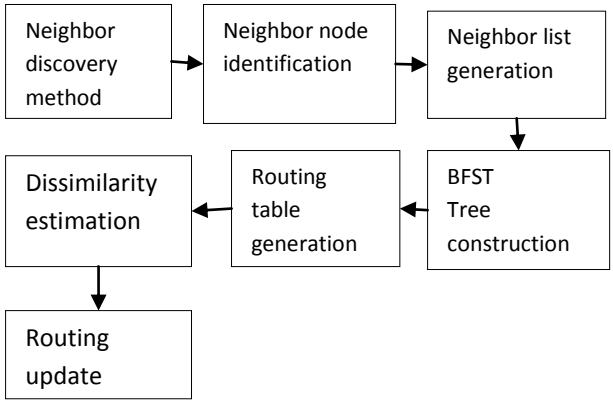

Fig 3.a system design

IV.proposed WORK

This paper introduces a new routing method to improve the performance of mobile ad-hoc networks, in which we develop an enhanced proactive source routing protocol for data transmission in such network. It reduces the routing overhead and enhances the reliability of data transmission between the mobile nodes. This scheme achieves several objectives and challenges. NS-2 gives better result for mobile ad-hoc wireless networks. In mobile ad hoc network the nodes are identify neighbor node by using hello message. The nodes are periodically broadcast the routing table information to their neighbor node within particular interval time (i.e. event time driven based). Based on the information collected from neighbors during the most recent iteration, a node can update its knowledge about the network topology by adding such recent information. This updated knowledge will be distributed to its neighbors in the next round of operation. When a neighbor node communication link is lost, a procedure is triggered to remove its relevant information from the topology repository. The proposed work consists of four modules and the modules are,

- Neighbor node identification
- Routing table generation
- Dissimilarity estimation
- Routing update

A. Neighbor node identification

In mobile ad hoc network, the nodes are infrequently moveable. The nodes are communicated via interface. The communication link between two nodes is broken then the link failure message is send node itself. The node wants to communicate with new node by using link association set message. The nodes are randomly movable in mobile ad hoc network so link broken and neighbor nodes are changed time to time. The distance estimation and transmission range are used to identify neighbor node. The distance between two nodes identified by using Pythagoras distance estimation formula. The formula is given below,

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Where,

$x_2 - x_1$ - Difference of x coordinates

$y_2 - y_1$ - Difference of y coordinates

The link stability and link failure between nodes are identified by using link stability estimation formula,

$$l_s = \frac{r}{d}$$

Where,

r –Transmission range (default value=250m)

d – Distance between two nodes

B. Routing Table Generation

In mobile ad hoc network, each node has routing table to maintain the routing information. The routing table consists of destination node, next hop, and hop count value. The breadth first

algorithm construct breadth first spanning tree for each node in the network. The routing table generated for each node in mobile ad hoc network by using their breadth first spanning tree. The number of nodes between source and destination calculated and this value called as hop cont. the shortest path between source and destination are identified by using hop count value. Routing table generation function contains routing table entry, routing table lookup, routing table delete.

Breadth first spanning tree

A tree whose edge set is a subset of the edge set of the graph G is called a spanning tree of G if the tree has exactly the same vertex set as G. We create a breadth first search tree centered at x0 in the following way.

- We put the vertex x0 in the tree and give it breadth first id is zero. Then we process the vertices in the tree in the order of their breadth first id as follows: We consider each edge leaving the vertex.
- If it is incident with a vertex z not in the tree, we put the edge into the edge set of the tree, we put z into the vertex set of the tree, and we assign z a breadth first id one more than that of the vertex most recently added to the tree.
- We continue in this way until all vertices in the tree have been processed.

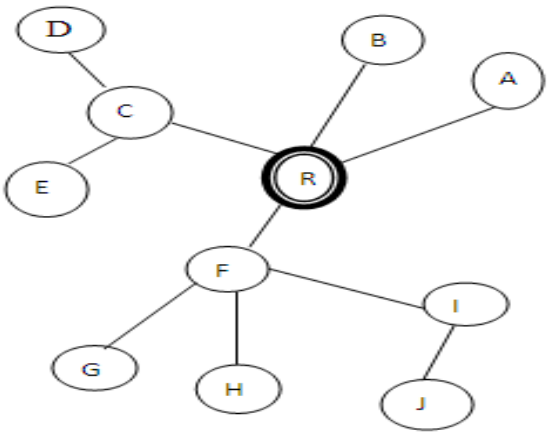

Fig 4.a mobile ad hoc network

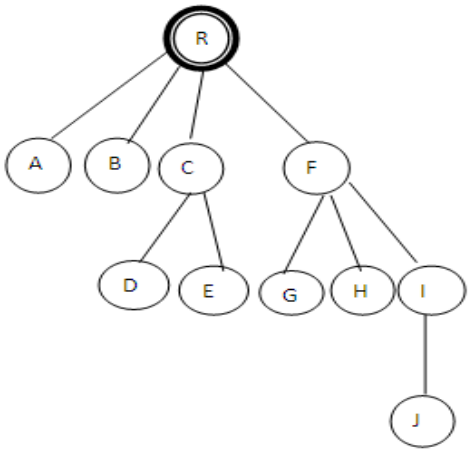

Fig 4.b breadth first spanning tree for node r

C. Dissimilarity estimation module

Dissimilarity estimation module finds difference between previous routing information and current routing information. Previous routing information extracted from existing routing table and current routing information means currently generated routing table. Each node verifies current routing information based on previous routing information. Find dissimilar between current and previous routing information. Routing table changes are identified from dissimilarity estimation. If dissimilarity value null then does not update the routing table otherwise update the routing table based on the dissimilarity measurement value.

D. Routing update module

The proactive routing protocol was update the routing information within particular time interval or infrequently. Routing update module, update the routing information in routing table. Routing table changes are identified by using dissimilarity estimation module. If any changes occurred in routing table then construct routing information from that routing table. Routing information forwarded to all neighbor node in neighbor node list. All neighbor nodes update its routing table based on received routing information. The nodes are communicated in mobile ad hoc network via transmission control protocol.

V. METHODOLOGY

The proposed system uses two methods for implementation. The methods are adaptive event time driven scheduling method and neighbor discovery method. The adaptive event time driven

scheduling method contain two sub functions namely time driven, event driven. Each node behavior scheduled via two ways.

Time driven

In mobile ad hoc network each node triggers the particular time interval. If routing update is received within interval then update the routing table. The routing update is does not received within interval then routing update time interval is exceed. When this time interval exceeds then each node does not update the routing table in mobile ad hoc network. If a node received link failure message from itself and link association set message received from neighbour node then it invoke event driven procedure. The link failure message indicates link lost between nodes and link association set message indicate link new link connectivity established between two nodes.

Event driven

In this procedure, each node checks whether neighbourhood node connectivity link is present or not. If node connectivity link lost then update the routing information in routing table. If does not lost neighbour node connectivity then does not update the routing table. This procedure reduces the number of routing update in routing table. So it will also reduce routing overhead in mobile ad hoc network.

The proposed system also uses neighbor discovery method to identify neighbor node in mobile ad hoc network. The neighbor discovery method used link association set message to handle the mobility. In neighbor discovery method, if any node newly communicate with other node then these node broadcast link association set message. Each node has many MANET interface. The nodes are communicated via this interface. If the communication link is broken between two nodes then the link layer reported link failure to node itself.

In our proposed system reduce routing overhead in mobile ad hoc network and it is compare with existing system proactive source routing protocol.

VI. PERFORMANCE EVALUATION

We study the performance of our work using computer simulation with Network Simulator 2 (ns-2). C++ and Tool Command Language (TCL) are the two languages used in NS-2. It uses TCL/OTCL (Tool Command Language/ Object Oriented TCL) as a command & configuration interface. Basically TCL is its scripting and frontend language and C++ is its backend language. NS-2 includes a tool for viewing the simulation results, called Network Animator (NAM). It uses three types of files namely Tool Command Language file (.tcl), Trace file (.tr) and Network Animator file (.nam). Tool command language file (.tcl) has subsets of commands which are written into it for simulation. While simulator runs on .tcl, simulation trace file (.tr) and animation file (.nam) are created during the session. Trace file (.tr) is used to trace the whole process and Network Animator file (.nam) is used to visualize the behavior of network protocols and traffic the model. We use various performance metrics required for evaluation of protocols. These matrices are important because it analyze the performance of the network.

We compare performance of the lightweight proactive source routing protocol with proposed system by using NS 2. To implement lightweight proactive source routing protocol first we describe what are the simulation parameters are used and it is described in table IV.

Table VI. SIMULATION SETUP

Simulation parameter	Simulation values
Channel type	Wireless channel
Propagation model	Two-Ray Ground
Network Interface Type	Phy/Wireless Phy
Interface Queue Type	Queue/Drop Tail/Pri Queue
Transmission Range	250m
Carrier sense range	550m
Network Dimension	1500m *1500m
Mobility	Random way point model
MAC Protocol	IEEE 802.11
Antenna Type	Omni directional antenna
Simulation Time	50
Number of nodes	50

The many routing protocol's performances are well known in the classic two-ray ground reflection propagation model, we select such a model as well in our simulation to present a consistent and comparable result. In modeling node mobility of the simulated MANETs, we use the random waypoint to generate node trajectories.

The performance of the proposed system measured using performance metrics such as routing overhead, end to end delay, packet delivery ratio. These metrics are calculated using formula and formula are described below.

- Packet delivery ratio: the ratio of number of packet received at destination and number of packet send by source node.
- End-to-end-delay**:** The time taken for a packet to be transmitted from the source to the destination.
- Routing overhead: the routing overhead is calculated using the total number of packet count.

Fig 6.a shows routing overhead with density of the proposed method and LPSR. The routing overhead of the LPSR is high when compare with proposed system.

Fig 6.b shows comparison of end to end delay with density between proposed method and LPSR. The end to end delay of the lightweight proactive source routing protocol is high when compared to proposed system.

Fig 6.c shows comparison graph of packet delivery ratio with density between proposed method and LPSR. The graph shown, the proposed system packet delivery ratio is better than LPSR protocols.

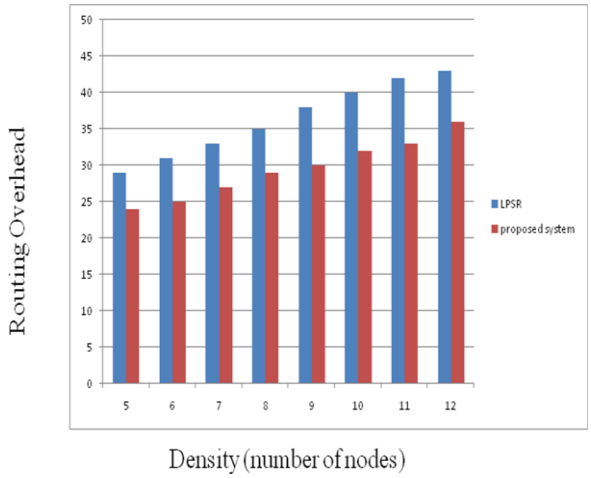

Fig 6.a Routing overhead with density

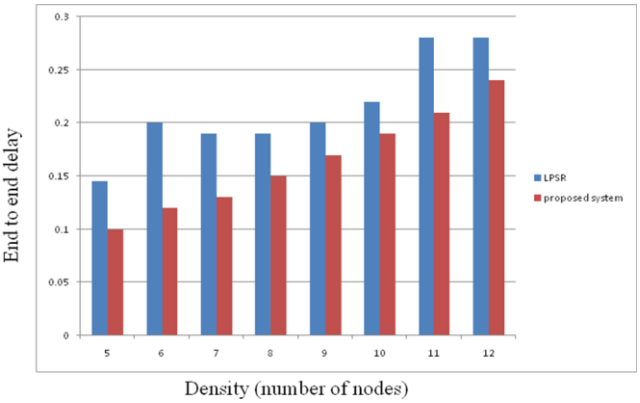

Fig.6.b End to end delay with density

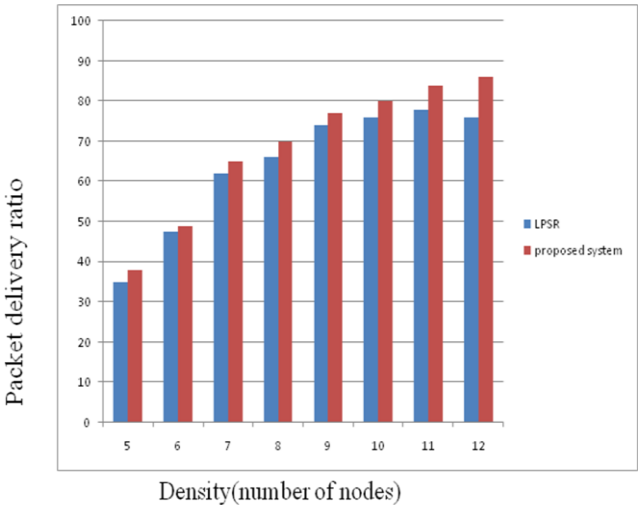

Fig 6.c Packet delivery ratio with density

V. CONCLUSION AND FUTURE WORK

The proposed system has been motivated by opportunistic data forwarding method in MANETs. LPSR protocol should provide more topology information than distance vector but it has smaller overhead than Link State routing protocols. The lightweight proactive source routing protocol uses a tree-based routing protocol, i.e., LPSR, which is inspired by the Path Finding Algorithm and the Wireless Routing Protocol. Its routing overhead per node is on the order of the number of the nodes in the network. The LPSR as with DSDV, but each node has the full-path information to reach all other nodes. The LPSR provide both proactive and reactive behavior and it has both advantage of proactive and reactive behavior. First, it uses the periodic route update message and hello message. Each node in mobile ad hoc network use route update message to exchange routing information between nodes and hello messages is used to identify neighbor node link is present or not. Second, find difference between previous routing information and current routing

information. This difference routing information is forwarded to their neighbor to reduce the routing overhead in mobile ad hoc network. As a result, the routing overhead of proposed system is small, when compared to LPSR protocol. The LPSR implemented using ns2 and performance metrics are evaluated using simulation values. Our future work is to provide the security of lightweight proactive source routing protocol in mobile ad hoc network.

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