AN EFFICIENT SOURCE ROUTING PROTOCOLS IN MANET

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Abstract;- A Mobile ad-hoc network (MANET) is a wireless network that contains different mobile devices. These mobile devices form a network with each other without any existing infrastructure or with any other kind of fixed stations. It is a self-configuring and self organized network of mobile devices. These devices can move in any other direction. The links between these devices will be change frequently, due to their movement. In a dynamic environment of the wireless communication network, nodes are independent and their mobility causes frequent change of Network connectivity. That nodes are in such network can act as end point of information transmission but router end points are in not same range. In a decentralize node is have responsible of finding the destination router or nodes, MANET is continuously maintaining the proper information to route the traffic. In this paper, propose a lightweight proactive source routing protocol (PSR) to provide Opportunistic data forwarding in MANETs that utilizes two common searching algorithms, called breadth first search (BFS) and as well as depth first search (DFS) to discover the route of the data flow in wireless network. In network topology, every node has neighboring node to discover route. Another method to discovers the route are a SSR can maintaining network topologies information than distance vector (DV) routing to provide source routing, and also it has smaller overhead than traditional DV-based protocols, link state (LS)-based routing, and reactive source routing. Simulations could be done in NS2 for the performance analysis to address the requirements of mobile ad hoc networks.

Key Terms:-Distance Vector, Secure Source routing, Mobile Adhoc Network (MANET), Dynamic source Routing (DSR), Optimized LS Routing (OLSR).

I. INTRODUCTION

A MANET is the wireless communication network that contains various mobile devices. These mobile devices form a network with each other without any existing infrastructure or any other kind of fixed stations. It is a self-configuring and Self-organized network of mobile devices. These devices can move in any direction. The links between these devices will be change frequently [7], due to their movement. In a dynamic environment of the wireless network, nodes are independent and their mobility causes frequent change of network connectivity. Nodes in such network can act as end points of data transmission as well as routers when the two end points are not in direct range of each other. In a decentralized network, a node is responsible to find the topology information and deliverance of data to the destination. The implementation of appropriate routing protocol is based on the nature of application. MANET continuously maintains the information required to properly route the traffic. MANET is a type of wireless adhoc network that usually has a routable networking. We propose a *proactive source routing* (PSR) *protocol* to opportunistic data forwarding in MANET. In PSR, each router maintains a breadth-first search spanning tree of the network routing at itself. This information is periodically exchanged that among those neighboring nodes for updated network topology data. Thus, PSR allows a node to have full path information to all nodes in the network, although the communication cost is the linear to the number of different nodes. This allows it to support both a source routing and a conventional IP forwarding. When doing this, we are try to reduce the routing overhead of the PSR as much as we can. Our simulation results are indicate that PSR has only a fraction of overhead of OLSR, DSDV, and DSR but still offer a similar or good data transportation capability compared with different protocols [1], [2].

II. RELATED WORK:

There are many routing protocols proposed for ad hoc networks. Each protocol has its own advantages, disadvantages, and its own environment / application where it can be used. Routing protocols of ad hoc networks can be classified into three categories: 1. Table driven Routing protocols, 2. On-Demand Routing Protocols and 3. Hybrid Routing Protocols. Figure 1.shows the classification and example for each classification. Other than these types, there is a new type of classification based on geographical

Positioning system called as Geographical position assisted routing[3].

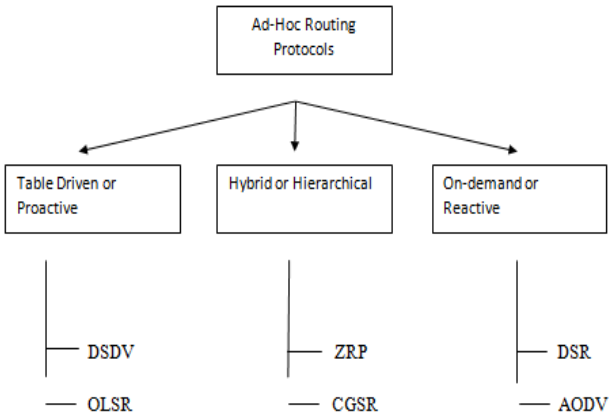

Figure.1 Classification of Ad-Hoc Routing Protocols.

This type of routing protocols is very familiar in fixed wired networks. In this approach, each ad-hoc node consists of a topology table, which contains the up to date networks nodes interaction information. This table is updated all the time and it gives the proactive protocols another name of *table-driven*. One or more routing tables are maintained at each node and are exchanged periodically to share the topology information with the neighboring nodes in order to maintain a consistent network view. Ad-hoc network based on proactive protocols, power and bandwidth consumption increased due to topology table exchange among nodes after each changing in nodes location. This takes place even if the network is in stand-by mode. The best network context for proactive protocols is the low (or no) mobility networks. The most accepted proactive protocols are DSDV and OLSR [1], [3], [4]. Reactive routing techniques, also called on-demand routing, take different approach for routing than proactive protocols. Routes to the destination are discovered only when actually needed. When source node needs to send packet to some destination, it checks it routing table to determine whether it has a route. If no route exists, source node performs route discovery procedure to find a path to the destination. Reactive routing protocols can dramatically reduce routing overhead because they do not need to search for and maintain the routes on which there is no data traffic. Such property is so much important in the resource-limited environment. The most accepted reactive protocols are DSR and AODV. They do not initiate path discovery by themselves, until they are requested, when a source node request to find a path. These protocols Setup of routes when demanded. When a node wants to communicate with another node in a network, and a source node does not have a path to the node it wants to communicate with, reactive routing protocols will establish a route for the source to the destination node[3],[5]. The hybrid routing protocol incorporates the functionalities of proactive and reactive routing. The proactively prospected route initiates the routing and in case of active nodes in the network, refresh the routes through reactive flooding. Predetermination of specific cases are required to choose one or other method [3], [4].

III. METHODOLOGY

This paper introduces a novel 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 diminishes the routing overhead and enhances the reliability of data transmission between the mobile nodes. This scheme achieves several objectives and challenges. To achieve our goal, some existing methods were used in our research. Such methodology improves the throughput and performance of MANET. Network simulator – 2 (ns-2) is generally used in this research area by the research communities. NS-2 gives better result for mobile ad-hoc wireless networks. Essentially, our method provides every node with a neighbor table for the entire network. To do that, nodes periodically broadcast the table information to their best knowledge in each iteration. Based on the information collected from neighbor's during the most recent iteration, a node can refresh its knowledge about the network topology by adding such recent information. This knowledge will be distributed to its neighbor's in the next round of operation. On the other hand, when a neighbor is deemed lost, a procedure is triggered to remove its relevant information from the topology repository maintained by the detecting node. Intuitively, the proposed scheme has about the same communication overhead as DV-based protocols. Differential update mechanism is also useful to reduce more routing overhead [5], [7].

1) Table Update

Due to its proactive nature, the update operation of our work is iterative and distributed among all nodes in the network. At the beginning, node is only aware of the existence of itself. By exchanging the table information with the neighbor's, it is able to maintain the network topology. In each subsequent iteration, nodes exchange their table data with their neighbors'. From the perspective of source node, toward the end of each operation interval, it has received a set of routing

messages from its neighbors'. Note that, in fact, more nodes may be situated within the transmission range of source node, but their periodic updates were not received by it due to, for example, bad channel conditions. After all, the definition of a neighbor in MANETs is a fickle one. (We have more details on how we handle lost neighbors' subsequently.) Source Node incorporates the most recent information from each neighbor to update its own table. It then broadcasts this information to its neighbor's at the end of the period. In fact, in our implementation, the given update of the table happens multiple times within a single update interval so that a node can incorporate new route information to its knowledge base more quickly. This does not increase the communication overhead at all because one routing message is always sent per update interval.

2) Lost Neighbor Information Removal

If a neighbour is disconnected from the network then each node removes all the data about the lost node. Such process is triggered by the following cases: No routing update or data packet has been received from this neighbor for a given time. A data transmission to such node has failed. This process can be initiated more number of times.

3) Differential Update

Mechanism In addition to dubbing route updates as hello messages in this mechanism, we interleave the ―full dump routing messages, with ―differential updates. The basic idea is to send the full update messages less frequently than shorter messages containing the difference between the current and previous knowledge of a node's routing module. Our goal is to broadcast the information stored at a node to its neighbor's in a short packet.

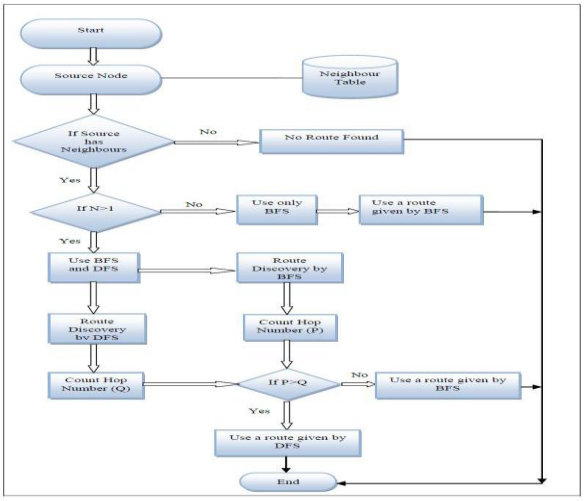

Fig .2 Data Flow Diagram

4) Route Discovery using BFS and DFS

The route discovery procedure is performed by Breadth First Search (BFS) and Depth First Search (DFS) in the wireless network. These search techniques work separately in the nodes of MANET. BFS and DFS algorithms are performed by two separate neighbor nodes of the source node. The optimized result is selected by such scheme and transfers the packet on the network. We can easily understand this process with Fig 2 that shows the data flow diagram [7].

5) Secure source routing (SSR)

A lightweight *secure source routing* (SSR) *protocol* to facilitate opportunistic data forwarding in a secure manner in MANETs. A linked list maintained in each source, intermediary and destination nodes regarding the list of nodes to which data is to be transmitted. Each time a packet is received a sequential search is performed through the list and the suitable next hop is detected. Each node is aware of the location of all nodes in the list Dynamic source routing protocols are quite inefficient in such cases as the route is determined dynamically on demand. This causes considerable delay in transmission [2].

IV. PERFORMANCE METRICES

MANET has number of a qualitative and a quantitative metrics that can be used to compare ad-hoc routing protocols. This paper has considered the following metrics to evaluate the performance of ad-hoc network routing protocols.

1. End-to-end Delay: This metric represents a average end-to-end delay and a indicates how long it took for the packet to travel from a source to the application layer of a destination. This includes all possible delay caused by a buffering during route discovery latency and transmission delays at the MAC, queuing at interface queue and propagation and the transfer time. It is measures in seconds.

2. Packet Delivery Ratio: A Packet delivery ratio is calculated by a dividing the number of packets received by a destination through of the number of packets originated by the application layer of the source. It specifies the packet loss rate and which limits the maximum throughput of the networks.

3. Throughput: Which is a measure of the number of packets successfully transmitted to their last destination per unit time and it is the ratio between the number of received packets and sent packets.

4. Packet Jitter: It is the variations of the delay of received packets. And a sender they are evenly spaced intervals and but due to traffic congestion and improper queuing or configuration errors they comes at unequal intervals.

5. Normalized Routing load: It is mention as number of routing packets transmitted, per data packet delivered at destination. Each hop-wise transmission of a routing is counted as one transmission at a time and is the sum of all control packet sent by all node in networks to discover and maintain routes.[5],[7]

Possible Outcome and Result

The major possible outcomes are as follows:

- PSR power consumption investigates without suppressing Hello packet. On theoretical assumption it is more energy consume in MANET.
- After suppressing Hello packet by suing [4], energy consummation and routing over head decreases effectively.
- Investigation add one more mile stone to prove PSR is effective routing protocol for ODF, by evaluating and reducing energy consumption in MANET[6]

V. PERFORMANCE ANALYSIS

Simulations to study the performance of PSR can be done in Network Simulator 2 version 2.35. Comparison of PSR against AODV, AOMDV and OLSR, the three basically different routing protocols in MANETs can be configured and tested in ns-2. Analysis of the performance of PSR with these protocols can be done to prove that PSR performs better than these protocols. The classic two-ray ground reflection propagation model is selected as in the simulation since many routing protocols are well known to present a consistent and comparable result. The baseline protocols OLSR, AODV, AOMDV are selected because they differ in their fundamental nature of routing. On one hand, OLSR is a proactive routing protocol and PSR is also in this category. On the other hand, OLSR makes complete topological structure available at each node, whereas in AODV, Ad hoc On-demand Distance Vector Routing, the use of destination sequence numbers utilized in DSDV [10] is combined with the on-demand route discovery technique of reactive protocols is combined to formulate a loop free, single path, on-demand DV protocol[11]. AODV uses hop by-hop routing instead of source routing. In AOMDV, Ad hoc On-demand Multipath Distance Vector Routing (AOMDV) multiple loop-free paths per route discovery can be computed.PSR sits in the middle ground, where a spanning tree of the network is maintained for routing purpose[4][5].

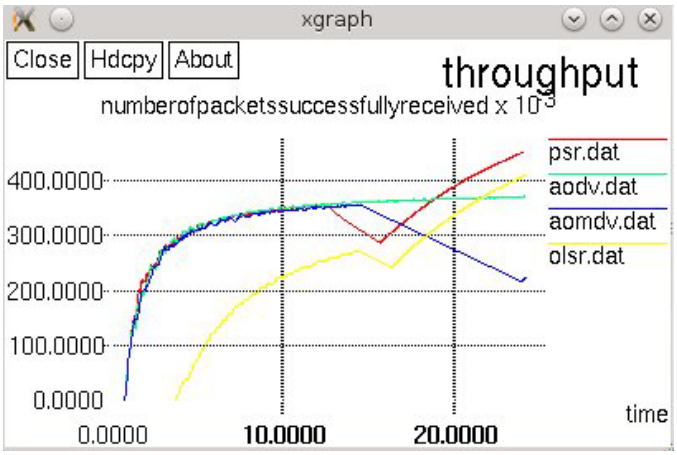

Fig.3 Throughput

Amount of data delivered per unit time is the throughput. Using our proposed routing method the throughput of PSR can be improved compared to other protocols as shown in Fig.3. The figure shows that throughput of PSR could be higher when compared with that of other three baseline protocols. Performance studies can prove that PSR can provide global routing information at low cost and can offer better or similar packet delivery performance [4].

VI. CONCLUSION

This paper has been motivated by the need to support opportunistic data forwarding in *MANETs*. To generalize the milestone work of ExOR for it to function in such networks, we needed a PSR protocol. Such a protocol should provide more topology information than DVs but must have significantly smaller overhead than LS routing protocols; even the MPR technique in OLSR would not suffice. Thus, we put forward a tree-based routing protocol, i.e., PSR, which is inspired by the PFA and the WRP. Its routing overhead per time unit per node is on the order of the number of the nodes in the network as with DSDV, but each node has the full-path information to reach all other nodes. DSDV has a least Normalized Routing load in both a low and a high traffic. An OLSR and DSDV give the Jitter and Average Delay in both networks Low delay and low jitter are mainly required in voice applications and real time applications and so OLSR and DSDV can be used in network. The applications like a voice and a video conferencing need more BW so in this case DSDV can be used there. The applications like web games, video telephony, etc. video telephony, these are require high throughput, so in this case AODV can be used under the low

Mobility and the low traffic and DSDV can be used under high mobility and a high traffic. There is a high mobility of users, network nodes at the time of emergency and military application operations. That we have observed that as the mobility increases the throughput of OLSR, DSR and DSDV. So these protocols can be used in emergency and military applications. SSR could be used for secure transmission of data packets from source to destination where the path can be specified as a part of source routing. It is the pure network layer scheme that can be built at top off-the-shelf wireless networking component and nodes in the network use the lightweight proactive source routing protocol to determine a list of intermediate nodes that the data packets should follow the end route to the destination nodes. Here, when the data packet is broadcast by upstream nodes and has happened to be received by at downstream node further along with the route and it continues its way from there and that will arrive at the destination router as soon.

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