International Journal of Applied Engineering Research ISSN 0973-4562 Volume 10, Number 14 (2015) pp 34277-34280
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Performance enhancement of maodv based multipath routing algorithm using link repair prediction technique

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Abstract- A mobile ad-hoc network (MANET) is a dynamic network and it has no infrastructure. It is a random topology by wireless link. The nodes are acting as mobile routers. The MAODV (Multicast Ad-hoc on-demand Distance Vector) routing protocol to provide good performance in light load condition. But in heavy load condition the performance to be reduced. In the MP-MAODV is presented, means to increase the network efficiency and also balance the network loads, reason for the result traffic are distributed through the two node dis-joint routes. To add the FORP (Flow Oriented Routing Protocol) protocol reduces the link break for the calculation of LET (Link Expiration Time).

Keywords- MAODV, MP-MAODV and FORP.

1. Introduction

A mobile ad-hoc network (MANET) is a self-configuring network of mobile routers (and associated hosts) connected by wireless links - the union of which form a random topology. The routers are free to move randomly and organize themselves at random; thus, the network's wireless topology may change speedily and randomly. Such a network may operate in a separate fashion, or may be connected to the superior Internet.

Multiple-Tree Multicast Ad Hoc On-demand Distance Vector Routing Protocol (MT -MAODV) Throughput range is higher than in AODV. But it provides only one link between the tree nodes and also it is effective only on the small scale multicast tree. For large scale multicast it provides less performance and its focus on video multicast.

MP-MAODV: a MAODV-Based Multipath Routing Algorithm PDR is 8% higher than MAODV. Throughput is 8kb/s higher than MAODV. Control overhead is 4% lower than MAODV. In MAODV the performance will be degraded under heavy load condition. But in MP-MAODV alternative paths are used so it is operating smoothly in heavy load condition. But path break is also occurring it is affecting the packet delivery ratio and latency

An Intelligent Multicast Ad-hoc On demand Distance Vector Protocol for MANETs Genetic algorithm Packet delivery ratio will be increased. In the GA-MAODV the parent node produces two child nodes and that node are producing the sub child node it from the multicast tree. The paper each node receives the multicast packet, and the multicast packets are broadcast by multicast tree.

Computation Of Multiple Paths in MANETs. Using Node Disjoint Method Node. Thus, the presence of node disjoint paths prolongs the network lifetime by reducing the energy depletion rate of a specific node. Mobility Prediction Mechanism Reduction in Control overhead.

Multicast routing in Wireless Mesh Network Repair the broken link. It avoids the formation of the loop.

MAODV-Based Multisource Multicast Routing with Fast Route Recovery Scheme in MANET, it is avoiding the bottleneck problem and also provide multisource route recovery. In this paper reduce recovery time and control overhead.

MP-MAODV is low control overhead and also high PDR value. It uses the alternative paths so it has reduced the data overhead. But link break also occurs. So we are used FORP. In addition used the FORP (Flow Oriented Routing Protocol) is reduce the link break use the LET calculation. In the LET to be calculated by the use of node position, number of packet transmission and movement of nodes. The position of the node to be known by the use of GPS (Global Positioning System)

2. Maodv route discovery mechanism:

MAODV protocol is broadcast the information only source is unknown the group leader and also source not a member in the group. When the source is added to the group or send the data at this time broadcast the route request (RREQ). The group leader or member of the group receives the route request immediately reply (RREP) to the source. The RREP message receives the source unicast MACT to send the destination. The route is activating source send the data to the destination.

But RREP cannot be receive the source for the particular time source send the new RREQ there is also no RREP for the given period means source assume I am the group leader because there are no groups. The source forms the group and unicast to send MACT, establish to send the data.

3. Route establishment using mp-maodv:

In MP-MAODV it creates alternative path. When the source broadcast the RREQ packets. It is receiving the group member to reply the RREP the source. The RREP receive the source for the first arrival time it is sending the MACT. The route is activated to the data packets are sent.

The source does not receive the RREP for the first arrival time. The source replies RREQ-S to the next node. It is receiving the group member to check the table the route is activated means the RREQ-S to be removed otherwise RREQ-S stored in the backup to establish a reverse route in the backup route table and send MACT-S to the next hop until this MACT-S forward to a group member. The multicast group node received the MACT-S then unicasts a RREP-S to the source node. The intermediate node that received MACT-S adds an entry to the backup route table to establish forwarding routes and then forwards it to the source node. So this mechanism can guarantee two node disjoint paths and avoided loops. So it used to reduce the link break.

4. Route establishment of forp:

Flow-oriented routing protocol (FORP) is an on-demand routing protocol that employs a prediction-based multi-hop-handoff mechanism for supporting time-sensitive traffic in ad hoc wireless networks. This protocol has been proposed for IPv6-based ad hoc wireless networks where quality of service (QOS) needs to be provided. The multi-hop-handoff is aimed at alleviating the effects of path breaks on the real-time packet flows. A sender or an intermediate node initiates the route maintenance process only after detecting a link break. This reactive route maintenance procedure may result in high packet loss, leading to a low quality of service provided to the user. FORP uses a unique prediction-based mechanism that utilizes the mobility and location information of nodes to estimate the link expiration time (LET). The LET is the approximate lifetime of a given wireless link. The smallest amount of the LET values of all wireless links on a path is termed as the route expiry time (RET). Every node is assumed to be able to predict the LET of each of its links with its neighbors.

The LET between two nodes can be estimated using information such as the current position of the nodes, their direction of movement, and their transmission ranges. FORP requires the availability of GPS information in order to identify the location of nodes. When a sender node needs to set up a real-time flow to a particular destination, it checks its routing table for the availability of a route to that destination. If a route is available, then that is used to send packets to the destination. Otherwise, the sender broadcasts a Flow-REQ packet carrying information regarding the source and the destination nodes. The Flow-REQ packet also carries a flow identification number/sequence number which is unique for every session. A neighbor node, on receiving this packet, first checks if the sequence number of the received Flow-REQ is higher than the sequence number corresponding to a packet belonging to the same session that had been previously forwarded by the node. If so, then it updates its address on the packet and extracts the necessary state information out of the packet. If the sequence number of the packet is less than that of the previously forwarded packet, then the packet is discarded. This is done to avoid looping of Flow-REQ packets. A Flow-REQ with the same sequence number as that of a Flow-REQ belonging to the same session, which had been forwarded already by the node, would be broadcast further only if it has arrived through a shorter (and, therefore, better) path. Before forwarding a Flow-REQ, the intermediate node appends its node address and the LET of the last link the packet had traversed onto the packet. The Flow-REQ packet, when received at the destination node, contains the list of nodes on the path it had traversed, along with the LET values of every wireless link on that path. FORP assumes all the nodes in the network to be synchronized to a common time by means of GPS information. If the calculated value of the RET, corresponding to the new Flow-REQ packet arrived at the destination, is better than the RET value of the path currently being used, then the destination originates a Flow-SETUP packet. The LET of a link can be estimated given the information about the location, velocity, and a transmission range of the nodes concerned.

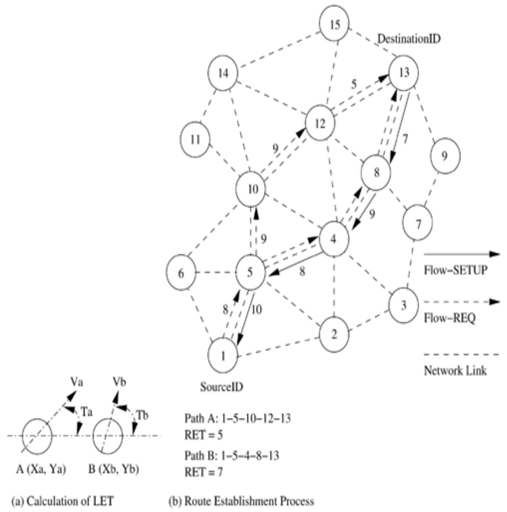

Fig:1 Route establishment in FORP.

The route establishment procedure is shown in Figure 1. In this case, the path 1-5-4-8-13 (path 1) has a RET value of 7, whereas the path 1-5-10-12-13 (path 2) has a RET value of 5. This indicates that path 1 may last longer than path 2. Hence, the sender node originates a Flow-SETUP through the reverse path 13-8-4-5-1.FORP employs a proactive route maintenance mechanism which makes use of the expected RET of the current path available at the destination. Route maintenance is illustrated. When the destination node determines (using the RET of the current path) that a route break is about to occur within a critical time period (Tc), it originates a Flow-HANDOFF, packet to the source node, which is forwarded by the intermediate nodes. The mechanism by which Flow-HANDOFF packets are forwarded is similar to the Flow-REQ forwarding mechanism. When many Flow-HANDOFF packets arrive at the source node, the source node calculates the RET values of paths taken by each of them, selects the best path, and uses this new path for sending packets to the destination. In the Flow-HANDOFF packets are forwarded by every intermediate node after appending the LET information of the previous link traversed onto the packet. The existing path 1-5-4-8-13 is erased and a new path is selected by the source node based on the RETs corresponding to different paths traversed by the Flow-HANDOFF packets. In this case, the path 1-6-10-12-13 is chosen. The critical time (Tc) is taken as the difference between the RET and delay encountered by the latest packet which has traversed through the existing path from the source to the destination.

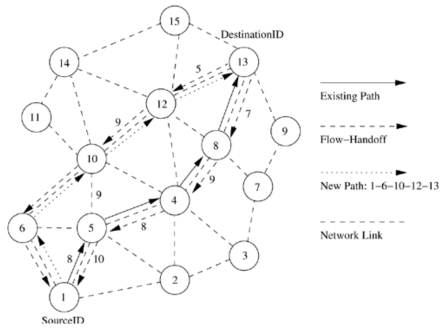

Fig:2 Route maintenance in FORP.

The use of LET and RET estimates reduces path breaks and their associated ill effects such as reduction in packet delivery, increase in the number of out-of-order packets, and non-optimal paths resulting from local reconfiguration attempts. The proactive route reconfiguration mechanism adopted here works well when the topology is highly dynamic. The requirements of time synchronization, increase the control overhead. Depending on the GPS infrastructure affects the operability of this protocol in environments where such infrastructure may not be available.

5. Mathematical calculation of let:

The LET of the wireless link between two nodes a and b with the transmission range T_x, which are moving at velocity V_a and V_b at angles Ta and T_b, respectively
Link Expiration Time

$$LET_{ab} = \frac{-(pq+rs) + (p^2+r^2)T_x{}^2 - (ps-qr)^2}{p^2+q^2}$$

$$p = V_a \cos T_a - V_b \cos T_b$$
$$q = X_a - X_b$$
$$r = V_a \sin T_a - V_b \sin T_b$$
$$s = Y_a - Y_b$$

6. Simulation Results

MAODV perform better in light load condition, but our MP-MAODV LPT performs good condition in heavy load condition. The simulation results show better PDR and Latency of MP-MAODV LPT compares than MAODV PDR and Latency.

If mobility is 1m/s slight changes are present but Mobility is 10m/s we see the good changes

Table:1 Performance comparison of MAODVand MP-MAODV LPT PDR With 1m/s

No. of receivers	1 sender		2 senders		5 senders	
	MAODV	MP-MAODV LPT	MAODV	MP-MAODV LPT	MAODV	MP-MAODV LPT
10	0.9936	0.99385	0.9660	0.97	0.91556	0.9232
20	0.9860	0.9928	0.9706	0.9628	0.90294	0.918
30	0.9583	0.973	0.9525	0.959	0.8625	0.8944
40	0.9302	0.967	0.8893	0.92	0.84984	0.8732

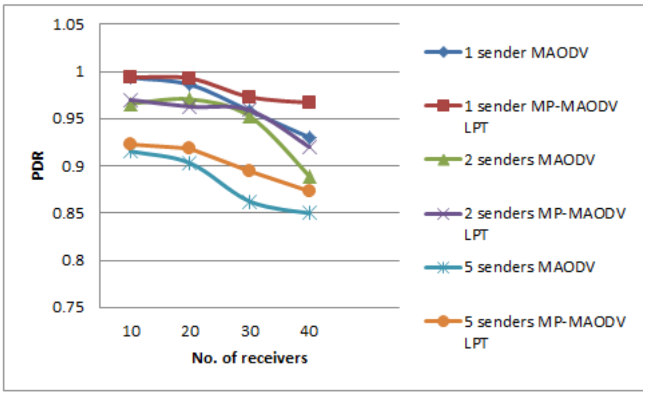

Fig:3 PDR with 1m/s

Table:2 Performance comparison of MAODVand MP-MAODV LPT Latency With 1m/s

No. of receivers	1 sender		2 senders		5 senders	
	MAODV	MP-MAODV LPT	MAODV	MP-MAODV LPT	MAODV	MP-MAODV LPT
10	0.0284	0.0272	0.0285	0.0281	0.03142	0.03011
20	0.0291	0.0273	0.0324	0.0311	0.03245	0.03014
30	0.028	0.02731	0.0356	0.0319	0.03352	0.03018
40	0.0271	0.02741	0.0451	0.0321	0.03410	0.03057

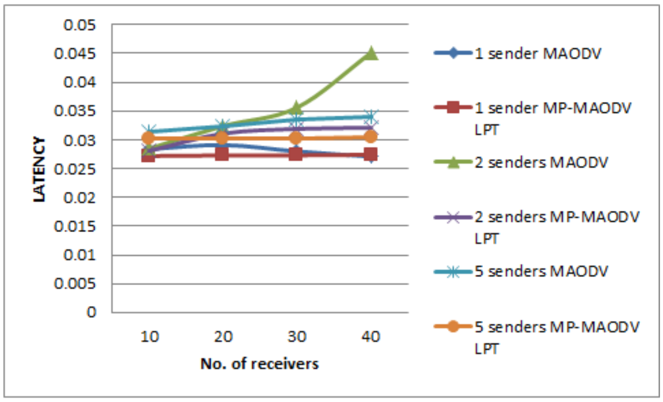

Fig:4 Latency with 1m/s

Table:3 Performance comparison of MAODVand MP-MAODV LPT PDR With 10m/s

No. of receivers	1 sender		2 senders		5 senders	
	MAODV	MP-MAODV LPT	MAODV	MP-MAODV LPT	MAODV	MP-MAODV LPT
10	0.9112	0.9128	0.9072	0.9082	0.851	0.872
20	0.9202	0.9321	0.915	0.9201	0.843	0.871
30	0.9304	0.9425	0.923	0.932	0.832	0.862
40	0.9405	0.9536	0.927	0.934	0.821	0.851

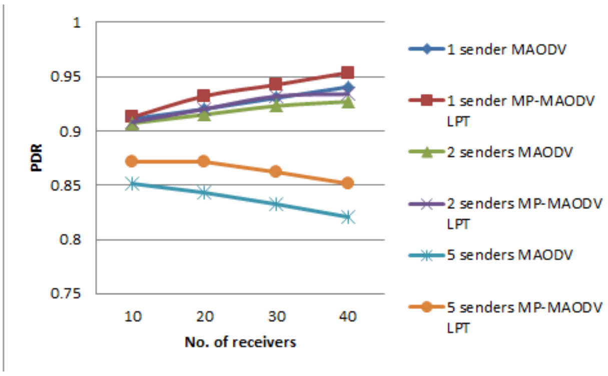

Fig:5 PDR with 10m/s

Table:4 Performance comparison of MAODVand MP-MAODV LPT Latency With 10m/s

No. of receivers	1 sender		2 senders		5 senders	
	MAODV	MP-MAODV LPT	MAODV	MP-MAODV LPT	MAODV	MP-MAODV LPT
10	0.0253	0.0253	0.0311	0.0295	0.0314	0.0312
20	0.0277	0.0262	0.0311	0.0308	0.0325	0.032
30	0.0282	0.0271	0.0318	0.03	0.0338	0.0326
40	0.02821	0.0271	0.031	0.0301	0.0342	0.033

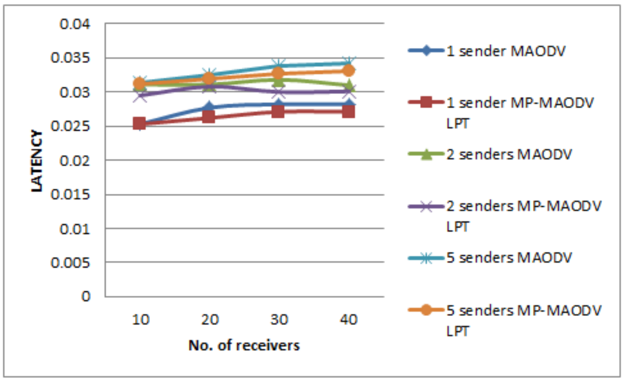

Fig:6 Latency with 10m/s

7. Conclusion

Many of the proposed multicast routing protocols have been simulated using NS/2. Because of the data forwarding problem, such metrics as throughput, end-to-end delay and the percentage of receiving packets are difficult to measure. In order to improve the packet delivery ratio and to decrease the latency MAODV protocol is used. Since bandwidth and power are limited in MANETs, they should be taken into consideration in routing/multicasting protocols. The development of a simulation for the NS/2 simulation would be extremely useful. In future it is planned to construct the bandwidth efficient multicast trees in MANET with the objective of minimizing the number of forwarders. It only focusses the LET value not the shortest path

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