International Journal of Electrical, Electronics and Computer Engineering **7**(2): 51-56(2018)

ISSN No. (Online): 2277-2626

Network Congestion Minimization using Enhanced AOMDV Routing in MANET

Pooja Raikwar[1] and Hitesh Gupta[2]

[1]Research Scholar, Department of Computer Science Engineering, LNCT, Bhopal, (Madhya Pradesh), India

[2]Assistant Professor, Department of Computer Science Engineering, LNCT, Bhopal, (Madhya Pradesh), India

(Corresponding author: Pooja Raikwar)

(Received 07 August, 2017 Accepted 20 October, 2018)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Reliable path discovery in dynamic node motion nature is a crucial while network structure is mobile ad hoc zone. Network link between source to end receiver is frequently change due to node mobility and no one can handle the link failure report, many researcher focus to overcome the problem of network link failure based on link stability time prediction and improve the network connectivity. Link failure increases the network congestion and overhead so that our proposed threshold based AOMDV routing minimizes network congestion and balance the network load. Ad hoc on demand multipath distance vector routing approach select the more than one route for communication where each selected path contain the maximum queue size and processing capability node with low mobility that increases the network reliability and minimize the network congestion. In this paper proposed enhance AOMDV routing simulate in different mobility condition and compare with exiting TALB-AOMDV routing through the network simulator -2. Result shows that proposed approach outperform as compare to existing TALB-AOMDV routing in every respect of network parameter in any condition.

Key words: Processing Capacity, link failure, AOMDV, TALB-AOMDV, Load balancing, Routing

I. INTRODUCTION

MANET (Mobile Ad-hoc Network) might be a assortment of mobile devices and is self configuring, resurgently dynamical, and wireless network that type a communication network via multi hop wireless network association. It's a self organizing network, with none central management. Devices at intervals the network communicate with another device as long because it lies within its transmission vary modification. Mobile wireless mobile network utilised in varied field like military and emergency services. Wireless mobile ad hoc communication follow the dynamic routing behaviour it means that network structure modification then modification their route table. The foremost issues for mobile Ad-hoc networks are measure MAC (Medium Access Control), routing, security and QoS (Quality of Service) provisioning [1], that's chiefly as a results of node quality, link failure, and restricted avail-able bandwidth. The routing challenge in MANETs is sender to produce} associate optimum path in less amount of it slow for data forwarding with restricted power offer, method and memory resources [2].

II. AD-HOC ON-DEMAND MULTIPATH DISTANCE VECTOR ROUTING (AOMDV)

Routing (AOMDV) protocol is AN extension to the AODV protocol for computing multiple loop-free and link disjoint ways. The routing entries for each destination contain a list of the next-hops at the aspect of the corresponding hop counts. All subsequent hops have the same sequence selection. This helps keep track of a route. For each destination, a node maintains the heralded hop count that is made public as a result of the foremost hop count for all the ways that is used for feat route advertisements of the destination. Each duplicate route promotion received by a node defines an alternate path to the destination. Loop freedom is assured for a node by exceptive alternate ways to destination if it is a less hop count than the heralded hop count for that destination. Because of the utmost hop count is used, the heralded hop count therefore does not modification for the same sequence selection. Once a route promotion is received for a destination with an even bigger sequence selection, the next-hop list and also the heralded hop count area unit reinitialized. AOMDV are going to be accustomed notice node-disjoint or link-disjoint routes to look out node-disjoint routes, each node does not forthwith reject duplicate RREQs. Each RREQs inward via a special neighbour of the provision defines a node-disjoint path. this may be as a results of nodes cannot be broadcast duplicate RREQs, thus any 2 RREQs inward at an intermediate node via a special neighbor of the provision could not have traversed the same node.

In an endeavour to induce multiple link-disjoint routes, the destination replies to duplicate RREQs, the destination exclusively replies to RREQs inward via distinctive neighbours. Once the first hops, the RREPs follow the reverse ways, that area unit node disjoint and so link-disjoint. The trajectories of each RREP might ran into at an intermediate node, but each takes a special reverse path to the provision to verify link disjoint ground. The advantage of exploitation AOMDV is that it permits intermediate nodes to reply to RREQs, whereas still selecting disjoint ways. But, AOMDV incorporates a heap of message overheads throughout route discovery because of increased flooding and since it is a multipath routing protocol, the destination replies to the multiple RREQs those results are measure in longer overhead.

III. CONGESTION AND THE NEED OF BALANCING

The main purpose of the protocol, the load balance has to divert the traffic from the congestion paths and nodes which exist in or big amounts of the data in transmit from to other nodes or host route [3]. Most of the routing protocols try to avoid congestion on routes and consider a metric to measure and compute the amount of congestion on the routes and the nodes are between source and destination.

IV. LITERATURE SURVEY

The aim to use MANETs, they collectively became a great deal of various and wide due to that higher performance is needed in MANETs. QoS is needed for applications for associate economical communication and load reconciliation is also a feature at intervals the routing protocol that will facilitate in an extremely higher use of the resources and would possibly facilitate to increase the performance of the network. they need an inclination to propose a different approach for load reconciliation in AOMDV routing protocol for MANETs that will enhance the network performance by selecting ways in which exploitation the temporal load on the intermediate nodes and by distributing the load amongst the free nodes whereas transmission of knowledge, that's proven by simulations in NS-2 [1]. Analysis of load reconciliation, draw back in Mobile unintentional networks [4]. The need a tendency to approach LBA-AOMDV, associate economical load reconciliation rule exploitation AOMDV (Ad-hoc On-demand Multipath Distance Vector) protocol for multipath route discovery and their maintenance [5].

Mahamed Abdelmadjid *et al* [6] presents a different approach to load reconciliation supported residual energy of nodes for distribute the traffic equally among the network nodes. We've an inclination to exploiting the multipath routing protocol AOMDV, that defines link-disjoint ways in which between the provision and conjointly the destination in every route discovery. We've an inclination to feature the energy metric for load reconciliation (ELB-AOMDV). The performance is compared between ELB-AOMDV and LBAOMDV.

They got discuss here several challenges whereas designing a routing protocol for manet appreciation to the restricted energy, less method capability, fewer resources and dynamic environmental changes. Most of this energy economical protocols focuses on choosing a route or path through the nodes with most residual energy and distribute network traffic blindly among generated ways in which. Network congestion caused due to traffic and node packet carrying capability supported its remaining energy do not appear to be thought-about that ends up in increasing sort of dead nodes and cause a great deal of energy depletion. so they got planned AN influence Aware Load reconciliation Multipath Routing Protocol (PALBMRP) that selects associate best energy economical route supported multiple [7].

Archana Shukla, *et al* [8] discuss a new approach of load equalisation. throughout this method queue length primarily based estimation routing with multipath routing AOMDV protocol are used for communication between the sender and destination. In addition to improved load leveling, the new technique conjointly provides multiplied support and congestion management as per existing network traffic levels and nodes method a whole lot. This proposes queue length primarily based load leveling a method exploitation multipath AOMDV routing is provides the advance in routing as compare to ancient AOMDV. The simulation has drained ns-2 machine and performance metrics are showing the upper ends up in case planned scheme.

Priyanka Sachdeva, *et al* [9] discuss Mobile unplanned Network (MANET) consists of mobile nodes that are a region of self-organizing and self-autonomous network. Since there's no centralized infrastructure in such a network, a extremely adjustive routing theme to upset the frequent topology changes and congestion is needed. Load equalisation seems to be an rising tool to use Edouard Manet resources in AN economical manner so as to enhance network performance. The load should be uniformly transferred to totally different various routes to provide effective utilization of the network, increase packet delivery quantitative relation and scale back packet delay.

Sunita Gupta, *et al* [10] discuss the predictable congestion management multipath mechanism is to limit the delay and management rate that is the most reason for congestion and provide higher performance of the network. During this analysis the projected congestion management theme with AOMDV protocol are uses bandwidth estimation technique. The data apprises estimation is finished through acknowledgement delay distinction. Sender changes inflicting rate in line with this delay distinction therefore avoiding congestion.

The performance comparison of traditional AOMDV routing, existing analysis is compare with projected theme and identified that the projected theme is provides higher routing performance by minimizing delay and management overhead.

V. PROPOSED CONGESTION CONTROL SCHEME

The section describe how the actual implementation done and execute. Network load balancing is a challenging task in mobile ad hoc network due to node characteristics and link availability issue but some of the area requires tuning and controlling the congestion and network load balance. The step by step process involves balancing the network load according to capacity of the network.

Algorithm: Dynamic Load Balance using Enhanced AOMDV routing in MANET

Input:

q_i: queue of node i
c_i: processing capacity of node i
l_i: location on node i
p_{ij}: path between node i to j
s: source node
r: receiver node

Output: packet send, receives, percentage of data receives, throughput, delay and normal routing load

Procedure:

If s search the fresh route than
i node receives the route packet
i update the status of utilization (q_i, c_i, l_i) if i utilization < threshold than
forward route packet to connected
hop else
busy message sends to s
node end if
if r get the route message by p_{ij} > 1
than select best two alternative path
send route reply to s
node s send data by
selected path end if
else
route not found next time slice research the
route end if
packet_send (s, r, data)
if p_{ij} is found && incoming flow > outgoing flow
than j store the packet in q_j
utilized the c_j of j
updated l_i while node
move forward packet
to next hop hop count
= hop count + 1
if j utilization > threshold than
send message to s node to rate
control else
normal flow
execute end if
else if p_{ij} is found && incoming flow < outgoing flow
than
normal flow execute
forward packet to next hop
hop count = hop count + 1
else
new route search
end i

VI. RESULT DESCRIPTION

In MANET nodes movement is unpredictable and because of that the number of connections, radio range of communication and grid layout of network is set according to maintain connectivity between the neighbour nodes. The simulation parameters are selected for communication is define in the table no 1. The performance of TALB-AOMDV and proposed multipath routing is measured according to these given parameters. The total numbers of connections are taken 5 to 35 and simulation time is taken 200 seconds. The proposed protocol is minimizes the congestion and improve performance in same given parameters. Result is retrieve through the network simulator-2 [11] that is free ware network simulator tool.

Table 1: Performance Parameter.

Factors	Input
Network Type	MANET
Nodes/Devices	5 to 35
Physical Medium	Wireless
Simulation Time	200 seconds
MAC Layer	802.11
Routing Protocol	AOMDV
Traffic Type	CBR
Number of Connection	5 to 35
Propagation radio model	Two ray ground
Rate	10 Packet/s

A. Packet Send Analysis

The all senders in network are sends data to destination. The number of senders that data is not delivery in on time is not sends a new data till the current one is not received at destination end.

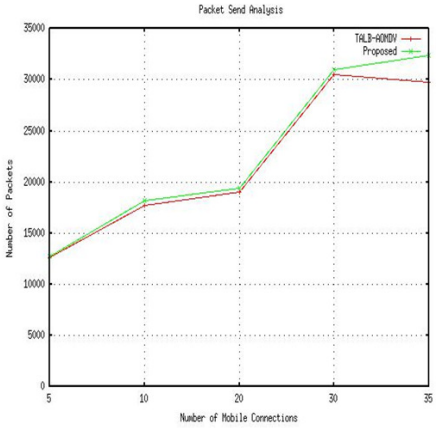

Fig. 1. Packets Sending Analysis.

In this graph the performance of two congestion control scheme is compare and finally the result is compare and get new propose congestion control queue management technique is better than the previous TALB-AOMDV protocol in MANET. The different scenarios of network with different connection in between sender and receiver is shows the packet sending in case of proposed scheme is better that means it handles the congestion more efficiently than previous scheme.

B. Packets Receiving Analysis

The congestion possibility in wireless connection is more due to limited available bandwidth and in MANET nodes movement is also another problem. In the packet receiver scenario while data drop is higher it means receiving is lower. In the below gnu plot result shows the packet receiving analysis of original TALB AOMDV and proposed congestion control queue based multipath routing. The number of packets received in TALB AOMDV is about 9700 highest in 10 connections and lowest about 6200 in 35 connections. This is shows that the performance of proposed scheme is reduces the congestion and provides consistent data receiving then TBRAOMDV.

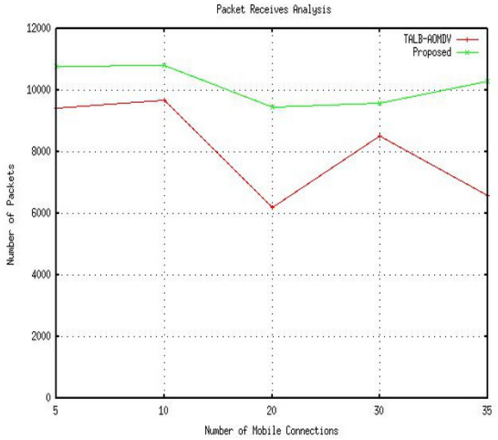

Fig. 2. Packets Receiving Analysis.

C. Percentage of Data Receiving.

In this section describe the percentage of data receiving analysis that measure number of data receiving out of number of data sends multiply by hundred . In the result snapshot shows the PDR performance of TALB AOMDV and proposed queue length estimation scheme is evaluated in given simulation time of 200 seconds. Here ad hoc on demand multipath distance routing provides the alternative path to deliver the data in network for balancing the load but not handle buffer capacity of nodes. The queue estimation of intermediate code is not easy to handle the congestion in MANET. In this graph, in case of TALB-AOMDV the PDF is about 77% in connection 15 and worst in heavy load about 21% but in case of proposed multipath routing the PDF is about 82 %. It means the propose method is equalize the network load properly in network and improves the network performance.

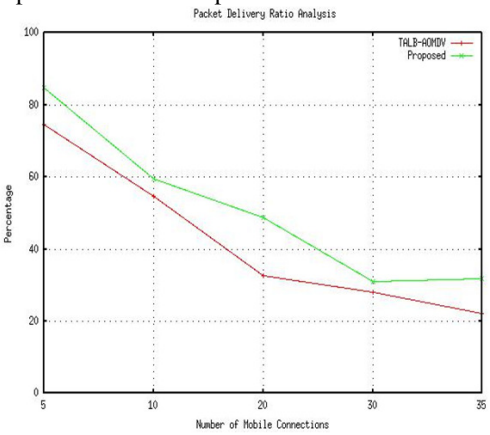

Fig. 3. PDR Analysis.

D. Normalize Routing Load

Normalize routing load is a total routing packet spread into the network through sender to finding destination. The Route (RREQ) is send by sender and forward to next node in network.

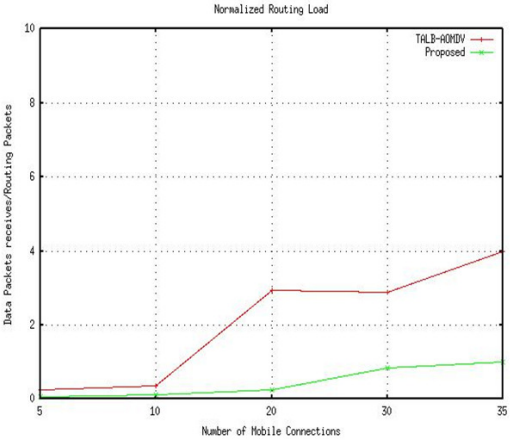

Fig. 4. Routing Overhead Analysis.

The routing packets flooding are playing the significant role in connection establishment and also the more routing packets flooding are also a question mark on link reliability because it indicates that due to congestion in network the strong link is congested and data is not forwarded to destination. In this graph routing packets flooding of TALB-AOMDV is flooded more routing packets as compare to proposed queue estimation based multipath routing but the time of proposed method the routing load is very low and good news is less than one, that is the sigh of better multipath routing. The proposed node queue estimation technique equalize the network load in proper manner by that the option of route packet retransmission is reduce and routing performance are increases.

The TALB AOMDV protocol is not able to handle overhead properly because it just provides the queue space for routing and data packets.

E. Average Delay

The amount of data are not reached in receiver node at a defined time interval that why delay in network is enhanced. The congestion in network is enhances the possibility of link expiration time because of that same data is take extra time to reach at destination in network. Below the result shows the delay performance is evaluated and the performance of proposed congestion control queue estimation scheme in all connections are provides less delay in network, that shows the congestion in network is come to an end. The congestion free routing performance is also enhancing the packet receiving and reduces the loss of data in network.

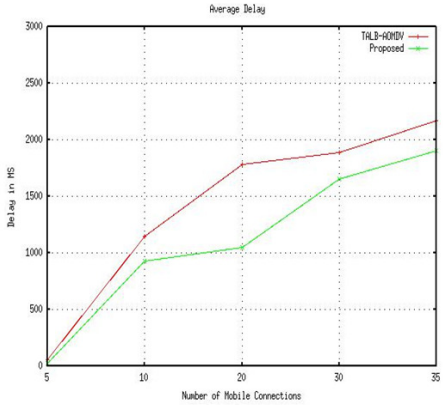

Fig. 5. Delay Analysis.

F. Throughput Performance Analysis

The amount of data are receives at receiver in time bases (recvs/seconds) of is evaluated through throughput performance metrics. In this graph the performance of different connections in both the protocols are assess and watch that the performance of proposed congestion control scheme is provides the better results.

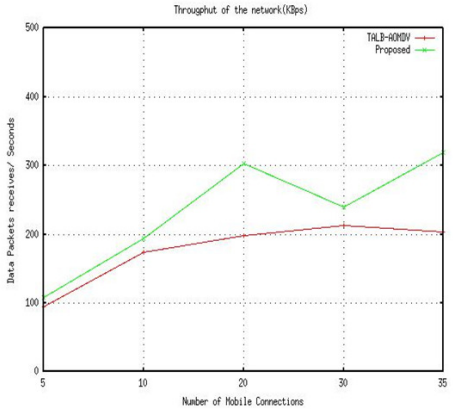

Fig. 6. Throughput Analysis.

The throughput in case of proposed queue estimation based routing is about receive more than 300 packets/seconds but in case of TALB AOMDV is about only 200 packets / second.

In enhancing the connection load in network increases then the TALBAOMDV performance is degrades but the proposed queue estimation routing performance is improves at the end of simulation.

VII. CONCLUSION AND FUTURE WORK

Mobile Ad hoc network devices are acquire the low processing capacity and battery power that arises the problem of frequently changing the network structure. In MANET this proposed scheme demands for efficient n number of paths to minimize the network congestion and provide reliable communication with fare distributed service. The performance of proposed queue estimation based routing is provides better results as compare to TALB AOMDV. The proposed approach is improves the performance by handling the congestion more efficiently then TALB AOMDV. The TALB AOMDV is also able to handle congestion but it is only based on very old approach. The proposed load balancing approach is handle the congestion and provides better performance then TALB AOMDV. The load balancing in network is required to handle the problem of congestion and the problem of congestion in any network is not possible to remove but the difference in congestion and attack is not justified without security scheme in MANET. In future we will propose the concept of security scheme against jamming attack because this attack is also congested link by flooding attacker unwanted packets in network. The Intrusion Detection System (IDS) is the technique to detect and prevent attacker from network. The attacker node is not receiving packets and the attacker is not sender but it is receiver. Now the IDS is work as that the malicious node is behaves as sender and broadcast unwanted packets to all nodes then detect it and block their presence in network.

REFERENCES

[1]. Gaurav Pathak, Krishan Kumar, (2017). "Traffic aware load balancing in AOMDV for mobile Ad-hoc networks "*Journal of communications and Information Networks*, Springer Singapore 2017.

[2]. M. Ali, B. G Stewart, A Shahrabi, A Vallavaraj (2012). "Multipath routing backbones for load balancing in mobile ad hoc networks", 16th *IEEE Mediterranean Electrotechnical Conference on (MELECON),* pp. 749 - 752, 2012.`

[3]. Hossam, H. and Z. Audrey, (2005). "Routing with Load Balancing in Wireless Ad hoc Networks", Proc.4th ACM MSWiM'01, Rome, Italy, 2005. P.89-96.

[4]. D. Maheshwari, R. Nedunchezhian, (2012). "Load Balancing in Mobile Ad Hoc Networks A Survey" *International Journal of Computer Applications* (0975 – 8887) Volume **59**– No.16, December 2012.

[5]. Monika Malik, Partibha Yadav, Ajay Dureja (2014). "Performance Analysis of Load Balancing in MANET using On-demand Multipath Routing Protocol" *International Journal of Advanced Research in Computer Engineering & Technology (IJARCET*) Volume **3** Issue 6, June 2014.

[6]. Mahamed Abdelmadjid Allalili, Zoulikha Mekkakia Maaza, Ali Kies, Redouane Belbachir (2012). "Distributed Traffic by Load-Balancing Approach for AOMDV in Ad-Hoc Networks" *Computer Science & Information Technology (CS & IT)* pp. 271–278, 2012. © CS & IT-CSCP 2012.

[7]. Ms. Madhuri Shinde, Dr. Shitalkumar Jain, (2017). "PALBMRP: Power Aware Load Balancing Multipath Routing Protocol for MANET" *Int. J. Advanced Networking and Applications* Volume: **09** Issue: 01 Pages: 3329-3334 (2017) ISSN: 0975-0290.

[8]. Archana Shukla, Sanjay Sharma (2013). "Queue Length based Load Balancing Technique using with AOMDV Protocol in MANET" *International Journal of Scientific & Engineering Research*, Volume **4**, Issue 10, October-2013.

[9]. Priyanka Sachdeva, Kamal Kumar Sharma, Sharad Chauhan (2015). "A Survey on Load Balancing Techniques in Wireless Networks" *International Journal of Recent Research Aspects ISSN: 2349-7688, Special Issue: Engineering Research Aspects* Feb 2015, pp. 49-56.

[10]. Sunita Gupta, Ghanshyam Prasad Dubey, (2016). "Enhanced Load Balancing and Delay Constraint AOMDV Routing in MANET" 978-1-5090-0669-4/16/$31.00 © 2016 IEEE.

[11]. http://www.isi.edu/nsnam/ns/