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Efficient Multi Path Transmission based on Load Sharing Metrics Instead of Load Balancing in Manet

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Abstract

Objectives: Manet is self configuring networks, in which a packet may be transmitted from source to destination through intermediate mobile nodes. Each intermediate node performs routing the packet to next neighbor node based on the routing information until it reaches the destination node. **Methods:** Ad hoc On-Demand Multipath Distance Vector (AOMDV) used to determine the multiple paths for the data transmission from source to the destination. The transmission delay may be reduced on distributed to multipath using load balancing technique in an equal fashion .This technique may not balance the load all times due to high traffic and more congestion. In the existing system the multipath transmission involves distributing packets along the equal fashion. **Finding:** Our proposed system the packets are transmitted in unequal fashion it will balance at all time, it's more packets are routed in less delay or heavy traffic are routed in less packets in metric based path are selected. **Conclusion/Application:** So this load sharing technique will minimize the delay and reduce the congestion.

Keywords: AOMDV, Load Balance, Load Sharing, Metric

1. Introduction

A mobile ad-hoc network is a temporary design to the processing of multiple wireless nodes. Messages are a transmission on each node to be minimum coverage area and forwarding packets to request the neighbor node, for this reason a node can act as both router and host. Each intermediate node performs routing the packets to the next neighbor node based on the routing information until it reaches the destination[1]. In ad-hoc used to determine the optimal paths for the data transmission from source to destination. Due to the optimal time, it reduces delay on to determine the multiple paths for data transmission. The packet may be distributed to multipath using load balancing techniques is an equal fashion. This technique may not balance the load all time due to the heavy traffic and more congestion in Figure 1. Load sharing technique is always true[2] i.e. it will balance at all time, even though the packets are distributed in an unequal fashion (metric based packets are shared between the multiple paths). These techniques depend on sending the information in multiple paths on the metric based balanced factor as well as load factor of distributing the packet in an unequal fashion. In Figure 2 each path checks the constraints of bandwidth, delay, load and the hop count or cost. In this constraints based on the path is decided to load the number of packets are transmitted. Then the performance of load sharing is compared with load balance, its unequal fashion of distributing the number of packets on the metric based shared across the multiple paths will be balanced at all time. The take it easy of the article is structured as follows: In Section II we discuss the background and related work. The proposed methodology of load sharing in Section III. Simulation results and analysis of the result performance is given in section IV. Conclusion and future enhancement presented in Section V.

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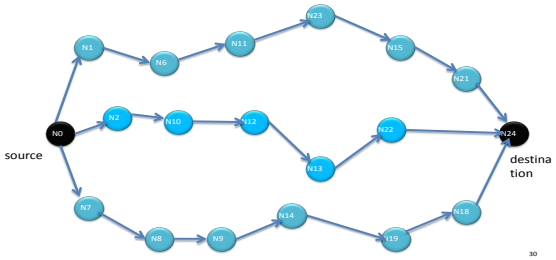


Figure 1. Route r2 are Less Traffic and Min Delay but R1 and R3 are Heavy Traffic and More Delay in Load Balance.

Figure 2. Basic diagram Load Sharing.

2. Background and Related Works

Load refers to the amount of data (traffic) being passed by the mobile ad-hoc network. An amount of data are group together is called a packet. When the entire packet is transmitted optimal single path using AODV, There may be a chance for heavy traffic and more delay[3]. So that the packet is transmitted multiple paths using AOMDV in Figure 3 and Figure 4, it reduce traffic and delay. Load balance is a total number of packets divide by multiple paths using Figure 5. The equal partition of a total number of packets in multiple paths, it save the time and reduce the congestion traffic, better bandwidth utilization. In[4] proposed increased throughput for load based channel aware routing in Manet with reusable paths. The multipath transmission involves distributing packets along the equal fashion it will not balance all time. In this paper each multiple paths are check sufficient of packet transmission based on unbalanced fashion, it provides more packet delivery and reduces packet overhead. In[5] proposed performance evaluation of load based channel aware routing in Manets with the reusable path. Each multiple paths are distributing the packets in an equal shared, not balance the load all times due to high traffic and more congestion. In this paper the user it deals with check the sufficient of packets are distributing in an unequal fashion, it reduces delay or congestion. So that more delay means less number of packets are transmitted and less cost means more packets are transmitted. In[6] proposed Congestion Aware Multi-Path Routing Protocol for Mobile ad-hoc Networks. These techniques are discussed to select the smallest amount on the overcrowded path instead of a minimum number of hops between sources to destination nodes. The user is not discussed check the constraints of the multiple paths that assign the each path are decided how much of packet are to be transmitted. In[7] proposed achieving energy efficiency in Manets by using load balancing approach. These techniques are proposed user check the only one constraints of energy based multiple paths are decided to transmission of the packet. In this paper number of hop count or cost, delay and load are not considered. In[8] proposed the local broadcasting algorithm with self-motivated multipath routing in mobile ad-hoc networks by QOS approach has proposed selection of a node by energy level and channel sensing the route discovery from source to destination. In this paper nodes are dynamically moving the mobility, so nodes are can join and leave that the certain range of communication channel based on the signal strength this other constraint are not discussed. In[9] proposed Enhanced trust based delegation for load balance in Manet has proposed heavy load, the node is delegated all the activities of the trusted neighbor node they performed to completed the task. In this paper, each multiple paths are sufficient of the packets or load to be transmitted in the data packets. Hence, it reduce heavy traffic node and increase computation time period.

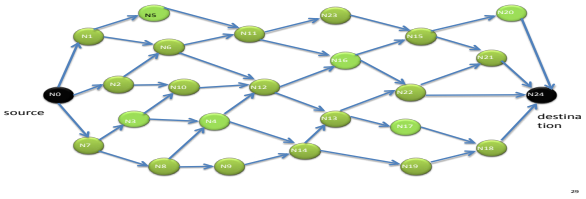


Figure 3. Aomdv using route request and route discovery from source to destination.

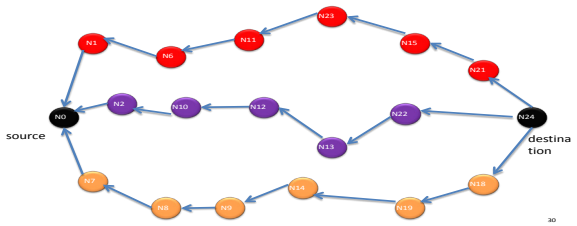


Figure 4. Aomdv using Route Reply from Source to Destination.

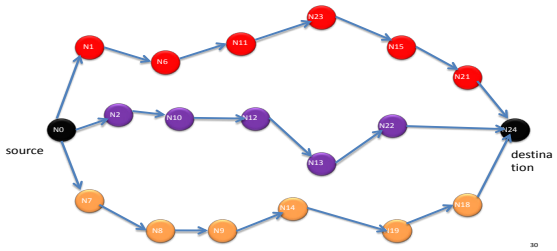


Figure 5. Route Discovery and Maintains in multiple path of Load Balance.

3. Proposed Work

In Figure 6 load sharing technique is multiple paths are distributing the packet in an unequal fashion, it also check the constraints or metric based on each multiple paths to be selected then the packet are transmitted. The metric based on the selection of the multiple paths are bandwidth, delay, load, hop count or cost. Here the hop count or cost is the main constraints of the path, it depends on the bandwidth, delay, and load. Every user thinks that if the minimum number hop count means less traffic can occur, so a number of packets to be transmitted. It occurred heavy load and more delay. Second constraints if the number hop count means less number of packets are transmitted. Hence, it occurred high bandwidth are utilization and takes more time. In this load sharing technique are unequal fashion is converted to the equal fashion on load factor and balance factor of transmitting the number of packets in an each path.

Bandwidth (B)

$$= \frac{signal\ strength}{time\ taken\ to\ be\ \ numbr\ of\ packets\ are\ trnsmitted}$$

Available Bandwidth (AB) =total allocation of bandwidth-number of packets are transmitted need for bandwidth.

Delay (d) =allocation of time period-Time taken to be total number of packets are received.

This bandwidth and delay constraints are Depends upon the load or number of packets, it occurs the heavy traffic and congestion. Number of constraints is based on bandwidth, delay and load Table 1.

Type I Constraints:

1. Heavy load or numbers of packets are transmitted.
2. High bandwidth or speed.
3. Heavy traffic or (number of hop or cost)
4. Delay or congestion.

Type II Constraints:

1. Heavy load or numbers of packets are transmitted.
2. High bandwidth or speed.
3. Heavy traffic or (number of hop or cost)
4. Delay or congestion.

In this type I and type II Constraints are fully based on load or number of packets is transmitted. Even though heavy load and minimum load depends on change the metric bandwidth, delay Table 2.

LOAD=BANDWIDTH=DELAY

When the heavy loaded means more bandwidth and delay can be occurred. When the minimum load means less bandwidth and less delay. In this Figure 7 the unequal fashion are sharing numbers of packets into the equal fashion. When the equal fashion is should be load factor as well as the balance factor. A load factor means number of packets or load can be transmitting the path it also metric based balanced in each path. They metric are balance on type I, II constraints assign the path load based balance factor.

Load Sharing (LS)

$$= \frac{Balance\ factor(BF) * Load\ factor(LF)}{multiple\ path} \quad (1)$$

$$\text{Load Factor (LF)} = \text{number of hop count} * \frac{1}{load} \quad (2)$$

If load is high means less number of hop count are transmitted and otherwise load is less means more number of hop count or cost are increase.

$$\text{Balance factor (BF)} = \text{Load} * \frac{1}{delay} \quad (3)$$

If load is high means delay can be increase otherwise when load is less means delay can be decrease.

CASE 1:

IF ((BF>LOAD) && (LF=$\frac{LOAD}{100}$*TOTAL NUMBER OF PACKETS)) (4)

Path is heavy traffic and more delay then it reduces the total number of packets, when a load the data its 20% only.

CASE 2:

IF ((BF==LOAD) && (LF=$\frac{LOAD}{100}$*TOTAL NUMBER OF PACKETS)) (5)

A Path is equal to the balance factor as well as the load, and then its transmitting the packets is 40%

CASE 3:

IF ((BF<LOAD) && (LF=$\frac{LOAD}{100}$*TOTAL NUMBER OF PACKETS)) (6)

Path is less traffic and reduces the congestion.

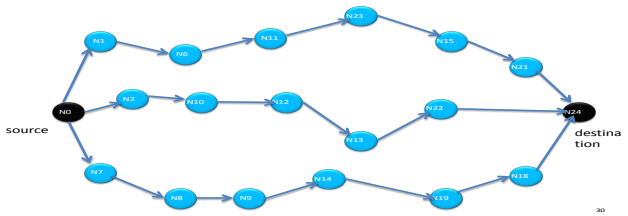


Figure 6. Load sharing technique transmitting the Packets are Check Constraints in the entire path based Load Factor and Balance Factor. All paths based on Load to Deduces the Traffic and the Congestion.

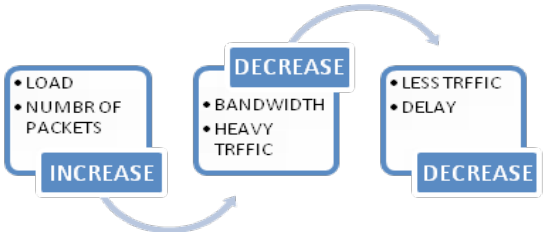


Figure 7. Increase and Decrease Load Sharing.

Table 1. heavy load, bandwidth and delay

1.heavy load or number of packets	High bandwidth and heavy traffic	More delay
2. heavy load or number of packets	Minimum bandwidth and heavy traffic	More delay
heavy load or number of packets	High bandwidth and less traffic	Min delay
heavy load or number of packets	Minimum bandwidth and less traffic	More delay

Table 2. Minimum load, bandwidth and delay

1. Minimum load or number of packets	High bandwidth and heavy traffic	Min delay
2. Minimum load or number of packets	Minimum bandwidth and heavy traffic	More delay
3.Minimum load or number of packets	High bandwidth and less traffic	No delay
4. Minimum load or number of packets	Minimum bandwidth and less traffic	Min delay

3.1 Algorithm for Load Sharing

Step1. Assign the number of packets (pkts).

Step2 .Find the multiple paths for routing in AOMDV.

Step3.Send the information on multiple path in metric based load and balance factor of distributing the packets in a unequal fashion.

Step4.Each path check the constraints of bandwidth, delay, load and the hop count or cost. In this constraints based on decided the path in load factor on number of packets are transmitted.

Step5.The balance factor of load is heavy or minimum, then share heavy traffic means more delay. Otherwise less traffic means min delay.

Step6.IF ((BF>LOAD) && (LF=$\frac{load}{100}$*TOTAL NUMBER OF PACKETS))

Path is heavy traffic and more delay

Else if ((BF==LOAD) && (LF=$\frac{load}{100}$*TOTAL NUMBER OF PACKETS))

Path is medium or chance for occurred in the traffic and min delay.

Else ((BF<LOAD) && (LF=$\frac{load}{100}$*TOTAL NUMBER OF PACKETS))

Path is less traffic and reduces the congestion.

Step7.Each path are check the constraints of Lf and the Bf before when the forwarding the packet, it should reduces heavy traffic and congestion.

3.2 Block Diagram for Load Balance and Load Sharing

Figure 3: Aomdv using route request and route discovery from source to destination

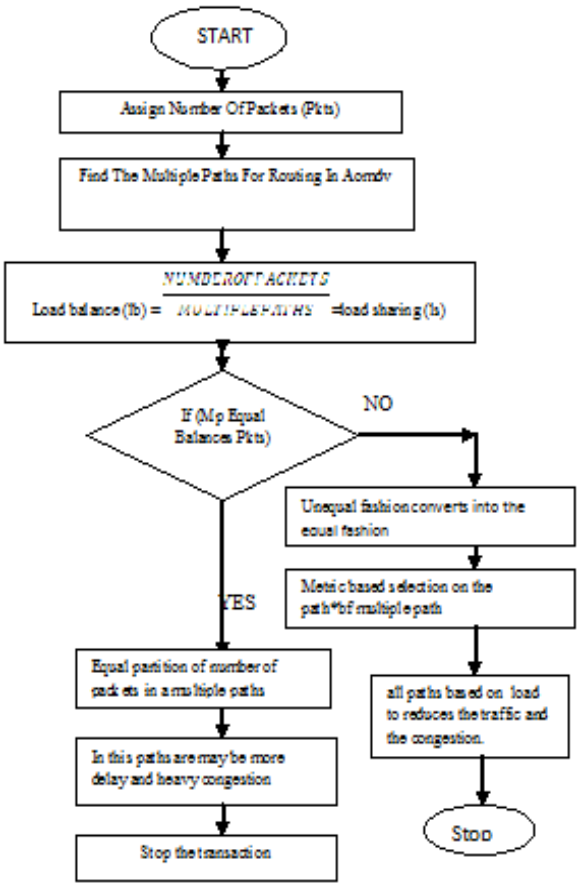
Figure 4: Aomdv using Route Reply from Source to Destination

Figure 5: Route Discovery and Maintains in multiple path of Load Balance.

Figure 6: Route r2 are Less Traffic and Min Delay but R1

and R3 are Heavy Traffic and More Delay in Load Balance. Figure 7: Load sharing technique transmitting the Packets are Check Constraints in the entire path based Load Factor and Balance Factor. All paths based on Load to Deduces the Traffic and the Congestion.

3.3 Flowchart for Load Sharing



4. Simulation Results

4.1 Simulation Model and Parameters

Ns-2[10] is used to simulate the efficient of multiple path transmission based on load sharing metrics instead of load balancing in Manets. In the simulation, the Packet Size is default and transmitting packet rate is depends on based on the load the packet. The simulation and parameters are summarized in Table 3.

Table 3. The simulation parameters

Number of nodes	24
Area Size	1500 X 1500
MAC protocol	802.11
Radio Range	250 m
Antenna	Omni directional antenna
Simulation Time	50 Sec
Traffic Source	VBR
Routing protocol	AOMDV
Packet Size	600 bytes
Mobility Model	Random Way Point
Rate	100 KB, 200 KB, 300 KB
Maximum number of packets in queue	150
Speed (m/Sec)	2m/Sec

4.2 Performance Metrics

We compare our Ad-hoc on-demand multiple path Distance Vector Load Balance (AOMDV-LB) and Ad-hoc on-demand multiple path Distance Vector Load Sharing (AOMDV-LS). In this Figure 8 Load Balance (AOMDV-LB) there may be much delay in equal partition of total number of packets in multiple paths since the paths are equally. The delay increase as the intermediate node between the sources to destination node increases. (AOMDV-LS) is No much delay variation in load Sharing .Since each path check the constraints of bandwidth, delay, load and the hop count or cost. In this constraints based on decided the path in load factor on number of packets are transmitted. The balance factor of load is heavy or minimum, then share heavy traffic means more delay otherwise less traffic means min delay based on increase packet delivery in Figure 9.

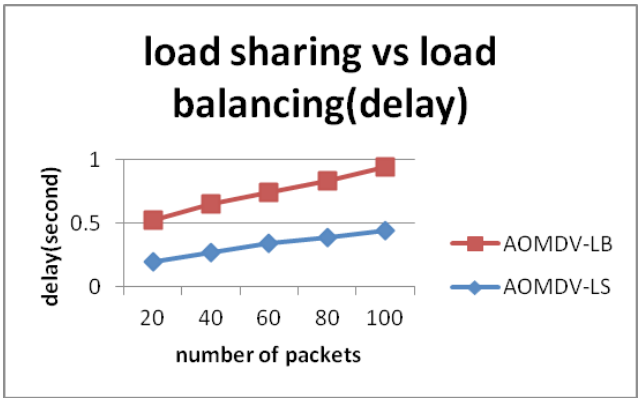


Figure 8. Load Sharing vs. Load balancing in delay.

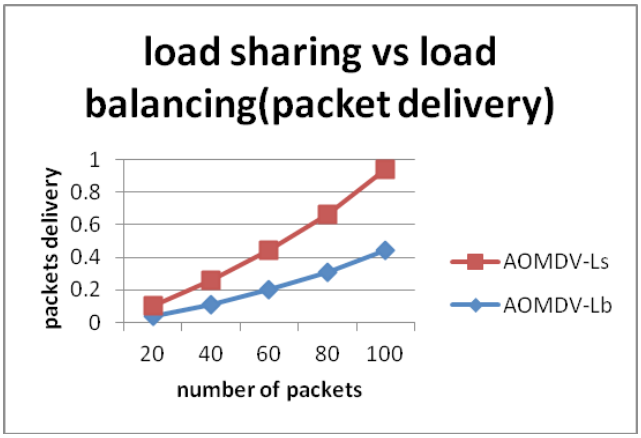


Figure 9. Packet delivery based on load sharing vs. load balancing.

5. Conclusion and Future Enhancement

In this paper, we proposed an efficient multipath transmission based on load sharing metrics to reduce the heavy load, congestion and delay. This proposed algorithm focuses on load sharing technique in a multiple path. This research helps to extend trust based load sharing implement in future.

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