iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** III **Month of publication:** March 2018

DOI: http://doi.org/10.22214/ijraset.2018.3546

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue III, March 2018- Available at www.ijraset.com

A Survey of Load Balancing Protocols in Manet

Gurasis Singh[1], Kamalpreet Kaur[2]
[1] *Assistant Professor, Guru Nanak Dev University College Jalandhar, Punjab Department Of Computer Science*
[2]*Lecturer, Govt. Polytechnic College for girls Jalandhar, Punjab Department Of Computer Science*

Abstract: Manet: Mobile Ad-hoc Networks are the networks that don't have any Centralised Authority that controls the whole network. It's structure is dynamic because of its movable nodes. They are free to move anywhere. Some nodes are powerful and do their task in less time and become idle, so splitting the efficiency among different nodes is necessary. This is balancing the load among different nodes. Our main purpose is to minimize the congestion and end-to-end delay, to inflate the performance. In this paper we present various load Balanced Routing protocols for efficient data transmission in MANETs. Various protocols are expanded for proper utilization of multiple hops in a network. The protocols that are to be expand are AODV, DSR, DSDV.
Keywords: Mobile adhoc network, Load balancing.

I. INTRODUCTION

A. MANET

Mobile Ad-hoc Networks are the networks that don't have any Centralised Authority that controls the whole network. It has dynamic topology because of its movable nodes. They are free to move anywhere. They can be configured anytime and anywhere. These networks uses the term multi-hop for its routing. The operation is distributed among all the nodes instead of a central point. The simplest example is Bluetooth. We can also easily create an adhoc network for sharing files between two pc's, laptops or mobile phone.

B. Applications

*1)Education Purpose :*Setting virtual classroom or ad-hoc communication through lectures and meetings.
2)In Military: Manets are useful in automation of battlefields in military.
3) Home and entertainment: Multi user gaming facility, theme park setups , robotic parks etc are also applications of manets

C. MANET Protocols

1) *Table Driven(proactive):* The proactive routing protocols maintains consistent and updated routing information from each node to every other node in the network. In this technique, the information must be updated periodically. It enables the routes which are never used. Ex:- DSR,DSDV
2) *On Demand(reactive):* This type of routing technique creates routes only when it is required by the source node. When a node requires a path to a destination, it enables a route discovery process within the particular network and this process is completed once a route is discovered. Ex:-AODV.
3) *Difference:* Reactive Protocols maintains the routes which are used whereas proactive protocols also maintains the routes which are never used.

D. Challenges

1) *Quality of service :* QoS model for a MANET is defined as providing a set of parameters in order to adapt the application to the ‘‘quality’’ of the network. Parameters such as delay time, bandwidth, cost, loss rate, and error rate.
2) *Energy Conservation:* Mobile devices depend on batteries for energy. Battery power is finite so it is one of the greatest constraints in MANET.
3) *Load balancing:* Mobile Ad hoc networks consist of a number of nodes having different computation efficiencies. Some nodes are powerful and do their task in less time and become idle whereas other weak nodes remain busy in their tasks. So there occurs imbalance of load among various nodes.
4) *Network Security:* Manets are wireless networks so there are many possibilities of data packet loss or hacking as compared to fixed wired networks. Security is very essential but difficult task in mobile adhoc networks due to the vulnerability of nodes and channels, absence of infrastructure of Manet and its dynamically changing topology.

©IJRASET (UGC Approved Journal): All Rights are Reserved

II. LOAD BALANCING SCHEME

In Manet when a node is powerful and complete its given task and becomes idle before a less powerful node, which is occupied all the time and consumes more energy.

The data flow could be efficiently controlled between various nodes and split on multiple paths and this scheme is called as load balancing scheme.

The difference between the performance of a more overloaded node and less overloaded node is efficiently improved by the load balancing technique.

The load balancing techniques helps to improve the end-to-end delay between various nodes and also minimizes the congestion.

A. Need For Load Balancing

Load balancing is needed so as to reduce the congestion in the network so firstly we need to analyze the non congested paths to distribute the load on the paths that remain idle. The load balancing schemes increases the efficiency of the network and reduce end-to-end delay. It also balances the energy consumption of the nodes in the network. It also enhances the utilization of resources in the network and helps to improve the overall performance of the network by reducing the collision by the distribution of load.

III. LOAD BALANCING PROTOCOLS

A. Load balancing protocols for dsr.

1) *DLAR (Dynamic Load Aware Routing):* It uses the least loaded route as the primary route selection criteria. There are three algorithms in selecting the least loaded route.

ALGO 1-It adds the routing load of each intermediate node and selects the route with the least sum. If two or more routes have load sum, the destination selects the route with the shortest hop distance.

ALGO 2-It uses the average number of packets buffered at each intermediate node along the path.

ALGO 3-It considers the number of congested intermediate nodes as the route selection metric.

2) *LARA:* LARA uses the traffic density and the traffic cost as the time required to access the shared medium is directly proportional to the traffic at the neighbors.

Traffic queue:- It is defined as the average value of interface queue length measured over a period of time.

$$t_i = \sum^{Y}_{X=1} t_{i(x)} / Y$$

Here, $t_i(x)$ is the xth sample of the queue length. t_i is the average of these Y samples.

Traffic density: - The node's traffic density is the sum of traffic queue t_i of node i and the traffic queues of all its neighbouring nodes,

$$T(i) = \sum_{j \in Y(i)} t_j$$

Here Y(i) is the neighborhood of node i and tj is the size of the traffic queue at node j: T(i) is the sum of traffic queues of all the neighbors of node i plus that of node I itself.

Traffic cost:- It is defined as the sum of the traffic densities at every node and the hop costs on that particular route.

$$H(r) = \sum_{i \in r} T(i) + \sum_{i,j \in r, i \text{ adj } j} h_{i,j}$$

Here $h_{i,j}$ is the hop cost along i and j. This protocol makes efficient route selection attempt based on traffic cost and density that leads to better performance than that of DLAR and DSR

3) *LBAR(Load-Balanced Ad hoc Routing):* This protocol is used to find out the route with minimum traffic and load in order that data packets can be routed with minimum delay.

This algorithm proposes four stages: Route Discovery; Path Maintenance; Local Connectivity Management; Cost Function Computation.

In Route Discovery there are two stages, forward and backward. In forward phase setup message is broadcasted which carry cost information, seen from the source to the current node. In backward phase the ACK message is send via the selected path (active path). Due to mobility if the path breaks, destination pick up alternative best-cost partial route and send the ACK message in Path Maintenance phase. In local connectivity management phase, each node send 'Hello' message to neighbor to check the path breakage.

The optimal path is determined on the basis of minimum traffic load in transmission and minimum interference by adjacent nodes.

©IJRASET (UGC Approved Journal): All Rights are Reserved

4) *LSR(Load Sensitive Routing):* LSR protocol utilizes the information of network load as the primary path selection procedure. The process to obtain network load information in LSR protocol, does not require time to time exchange of load information among adjacent nodes and is suitable for any type of routing protocol. Unlike DLAR and LBAR , LSR protocol does not require the destination nodes to wait for all the possible paths. Instead, this protocol uses a redirection method to obtain better paths efficiently.

B. Load balancing protocols for AODV

1) *D-LAOR(Delay-based Load-Aware On-demand Routing):* This protocol uses the best path on the basis of the hop count, the estimated total path delay and the route selection method. The delay of each node is calculated based on packet arrival time and packet transmission time.

The average delay at node includes the queuing contention and transmission delays.

Then total path delay is calculated by sum of node delay from source to destination.

$$Dp = \sum Q_K \quad (k=1\ldots n)$$

Where Q_K is the node delay. In route discovery process, the RREQ packet carries hop count, and the total path delay Dp of a path P. On receiving the RREQ packet the destination node send RREP packet back.

If the duplicate RREQ packet has a minimum total path delay and hop count than the previous one, the destination sends a RREP packet again to the source node to change the route immediately.

2) *WLAR(Weighted Load Aware Routing):* WLAR protocol is an extension of AODV protocol as it distributes the traffic between various adhoc nodes through load balancing method. It uses total traffic load, as a route selection criteria.

To find the total traffic, Queue size and sharing nodes are used. The total traffic is the product of average queue size and number of sharing nodes.

Total traffic load in node is defined as its own traffic load plus the product of its own traffic load and the number of sharing nodes.

3) *SLA (Simple Load-balancing Approach):* In this protocol each node is to drop RREQ or to give up packet forwarding depending on its own traffic load. Meanwhile, the mobile nodes deliberately give up forwarding the packets to save the energy of its own. To make the nodes volunteer in packet forwarding a scheme known as Protocol Independent Fairness Algorithm (PIFA) for packet forwarding is suggested.

It is a credit based scheme in which the node can earn the credit when it forwards the packet, this method is used to prevent selfness of node, that drop the packet to save the battery power of its own. There is server node called Credit Manager (CM), which manages nodes' Credit Database (CDB).

Other MANET nodes gives report to CM periodically on the no of packets they forwarded in each time interval in MANETs using PIFA, nodes can originate packets only when they have much credits that can be earned by forwarding the packets of others.

4) *CLAR(Correlated Load-Aware Routing) :* CLAR considers the load of traffic through the neighbouring nodes, as the primary route selection criteria. The traffic load is based on traffic passing through the particular node and neighbouring node. The destination node selects the best route among multipaths. When the RREQ goes to the final node, it selects the path with less traffic load as an optimal route. If there are more paths, which have the same traffic load, the final node selects the path with the minimum hop distance. When there are still multiple paths that have the least load and hop distance, the earliest path arrived at the destination is chosen.

C. Load Balancing Protocol For DSDV

1) *ABR(Associativity Based Routing):* ABR defines a new metric for routing known as the degree of association stability. It is free from loops, deadlock, and packet duplicates. In ABR, a route is selected based on associativity states of nodes. In this manner, the routes selected are likely to be long-lived and hence there is no need to restart frequently, resulting in higher attainable throughput. Load balancing is done during the route discovery process. At first the source sends a broadcast query (BQ) message to find the nodes that have a path to the destination. All the intermediate nodes that are receiving the query append their associativity tricks and addresses with their neighbours along with their route relaying load (RRL) information into the query packet. In this way the query packet arriving at the destination node contains associativity ticks and relaying load information of nodes along the route. The destination node thus knows, at an appropriate time after receiving the first BQ packet, all the possible routes and their qualities. ABR considers acceptable paths with nodes that don't exceed the maximum allowable RRL.

©IJRASET (UGC Approved Journal): All Rights are Reserved

Among the acceptable paths, the destination node selects the most optimal route and sends a reply to the source node via the path selected. If multiple paths have the same overall degree of association stability, the route with the minimum number of hops is selected. In this way ABR avoids congested nodes.

D. Current State Of Art

1) For DSR Protocol

AUTHOR	YEAR	PROTOCOL	DESCRIPTION
S.J.Lee et al.	2001	DLAR	DLAR periodically updates the status of congestion and re-configures the paths dynamically that are congested. Using the least loaded paths helps in balancing the load of the nodes in the network and utilises the network resources effectively.
Vikrant Saigala et al.	2004	LARA	Uniformly distributes the load among all the nodes in the network, leading to better overall performance. LARA provides the enhanced route selection attempt based on traffic density and traffic cost
Hassanein et al.	2003	LBAR	LBAR provides quick response to link failure by patching up the broken routes in use, thus guaranteeing reliability of data transmission.

2) For AODV Protocol

AUTHOR	YEAR	PROTOCOL	DESCRIPTION
J-H.Song et al.	2003	D-LAOR	Increases packet delivery fraction and Decreases end-to-end delay in a moderate Network scenario in comparison to AODV and other LAOR protocols.
Dae-Choi Et al.	2003	WLAR	Avoids the influence of burst traffic
Y.Yooet al.	2004	SLA	It minimizes the concentration of traffic by allowing every MS to drop RREQ or to give up the packet forwarding that depends on its own traffic load.
Kyungshik Lim et al.	2004	CLAR	Better suited for the heady load networks with low mobility.

V. FUTURE SCOPE

As we have discussed the need to balance the load in Mobile Adhoc Network, So the existing Protocols need to be Improved. There are extended Protocols of All Types, but may have limitations, as not to give the proper Traffic cost of a certain Path. So further they need to improve the actual Traffic cost rather than their Estimation. In Future AOMDV Protocol will be Extended, So as to Improve its Current performance.

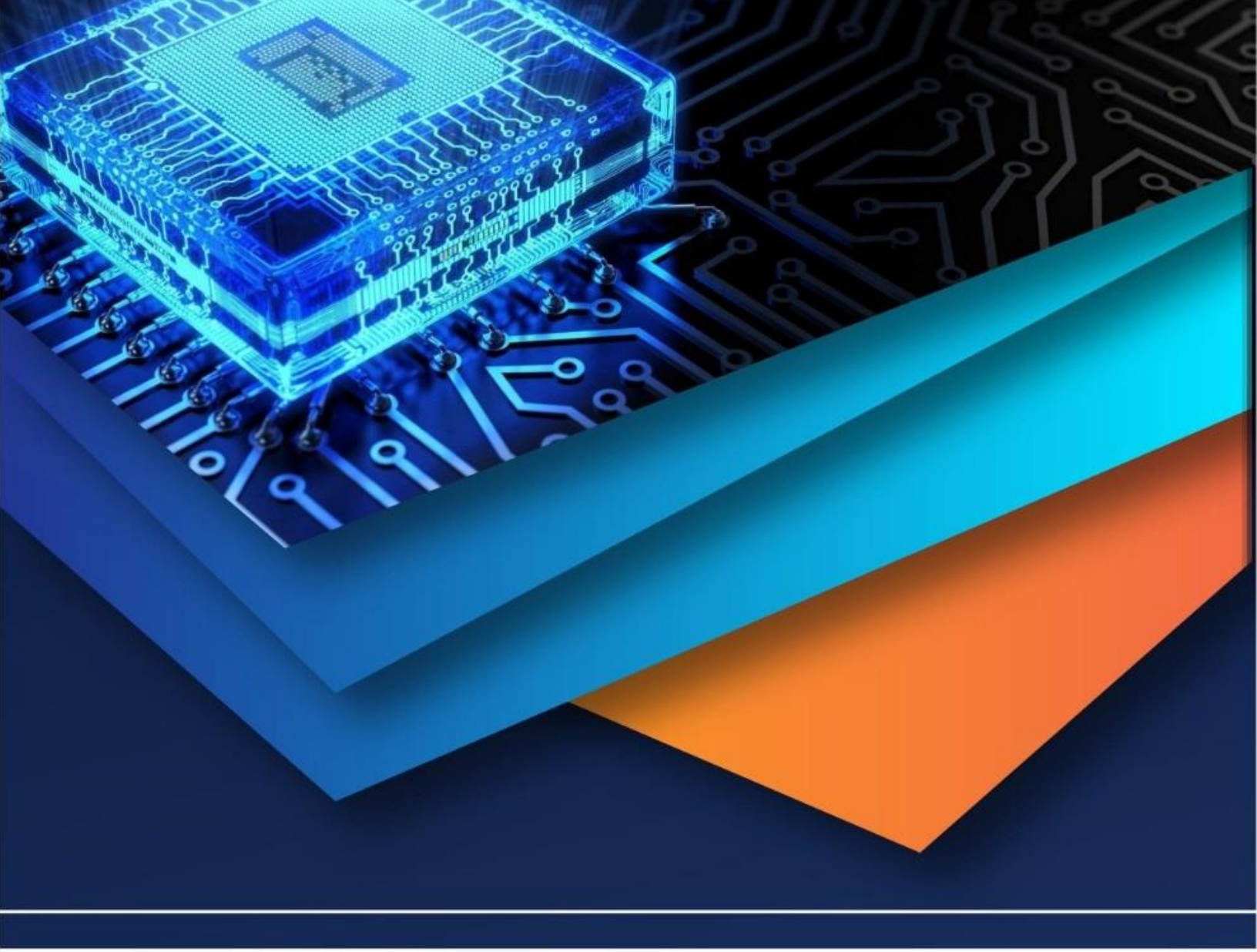
VI. CONCLUSION

In MANET, to improve the performance, it is very essential to balance the load. Load balancing is used to increase throughput of the network. We can maximize the nodes lifetime, packet delivery ratio, and minimize traffic congestion and load unbalance, as a result, end-to-end packet delay can be minimized, and network energy consumption can be balanced. In this paper we have discussed some load-balanced routing protocols for mobile ad hoc networks (MANET). Nodes in MANET have limited bandwidth, buffer space, battery power etc. So it is essential to distribute the traffic among the mobile host. There are different metrics used for the route selection.

REFERENCES

[1] Imrich Chlamtac, Marco Conti, Jennifer J.-N. Liu, Mobile ad hoc networking: imperatives and challenges.
[2] Elsevier,Ad-Hoc-Networks(2006).
Dr. A K Verma,Introduction to MANET
[3] H. Hassanein, and A. Zhou, “Load-aware destination-controlled routing for MANETs”, Elsevier Computer Communications 26(2003), pp.1551-1559
[4] . Wu, J. Harms, “Load Sensitive Routing for Mobile Ad Hoc Networks”, Proc. IEEE ICCCN’01, Phoenix, AZ Oct. 2001, pp. 540-54
[5] Mrs.ASHWINI.B.PATIL," Survey of Load Balancing Routing in MANET ", Assistant Professor, Department of Information Technology. Rajarambapu Institute of Technology, Rajaramnagar, Islampur. (2012)
[6] Ramandeep Kaur, Gagandeep Singh , Sahil Vashist," Survey on Load balancing protocols in MANET’S (mobile ad-hoc networks)" (2014
[7] Vinh Dien HOANG, Zhenhai SHAO and Masayuki FUJISE," Efficient Load ,balancing in MANETs to Improve Network Performance".

©IJRASET (UGC Approved Journal): All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)