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A Comparative Study of Delay, Traffic and Hybrid Based Load Balancing Routing Protocols in Mobile Ad Hoc Networks

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Abstract: ***Mobile ad hoc network is a wireless collection of mobile nodes with high mobility, that are connected over a wireless medium such as mobile phones, laptops etc. To create a routing with high reliability is one of the important challenges of mobile ad hoc networks. Therefore, the network load balancing and congestion are the major issues problem in mobile ad hoc network, number of task and routing creating has been proposed. The different metrics is based on the traffic loads to distribute the load on their among network nodes for the proposed protocol. To improve the network performance we have to choose an appropriate metrics. During the routing is created we have try to achieve load balancing and to avoid the additional routing overhead.***

Keywords: Mobile ad hoc Networks, Routing, Load balancing.

I. INTRODUCTION

The most challenging of mobile ad hoc networks is a routing protocol which the limitations of dynamically topology change, adding complexity of routing. Many years over, there are many routing protocols for MANET has been emphasis on the load balancing. The main objective of load balancing is to divert traffic from nodes and the path that exist in the congestion network. If there is no load balancing Mechanisms it will cause delayed increases. Most of the routing protocols which they consider load balancing metrics due to chosen in order to a path high performance. Therefore, in this paper we will study the load balancing techniques are very important which they are categorized into three ways: delay, traffic and hybrid based on the comparative study.

II. NODES LOAD BALANCING

Load balancing is an important part of a network. For example, if huge loads to the nodes with the low processing and none of the nodes have to share the load, then the result is complex. A node which has high processing power after finishes its work low load of its estimates quickly time. So there are require more and more nodes need to balance. Multi-path routing is the better than a single path routing which can balance the load in networks. Which is the best choice for the shortest path routing is used. A large number of nodes in the network it is possible between any pair of source. Load balancing by using a multiple paths instead of using a shortest path is improved. Thus a network require for better load balancing distributed among the nodes that multi-path load sharing strategy is used. And can balance the load better than single-path routing protocols to communicate [7][8][9].

III. ROUT SELECTION

A path is an activity which is the most packet delivery, end-to-end delay is reduced and better throughput between source and destination pairs for the network and which traffic is prevent to the direction. Optimal route selection for the load balancing

which to be identify the nodes that are more active and taking various parameters to be optimized route to get the better performance. We consider two paths for choosing the optimal path are: Active path and inactive path.

IV. CONGESTION AND THE NEED OF BALANCING

The main goal of the protocol, the load balance has to divert the traffic from the congestion paths and nodes that exist in or larger amounts of the data in transit from to other nodes or host route [2]. Most of the routing protocols try to avoid congestion on routes and consider a metric to measure and calculate the amount of congestion on the routes and the nodes are between source and destination [3]. To solve the traffic congestion on routes where there are relatively total throughput and reduced the latency generally increases the traffic congestion, including packet loss rate, end-to-end delay and battery power consumption. Since routing protocols use for the route as a routing metric [4][5][6].

V. PROTOCOL BASED ON THE LOAD BALANCING

Over the years, there are many routing protocols have been proposed load balancing which are the most methods of application protocols that are based on load balancing strategies are combined with the route discovery, low load path which is usually chosen may be from source to destination. As shown in fig: the routing protocols can be divided into three types based on load balancing are follows as [10]:

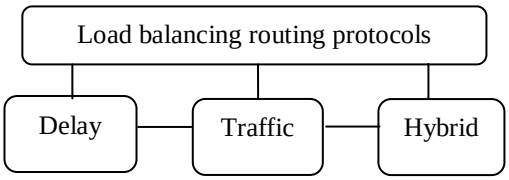

Fig: classification of load balancing routing protocols

VI. DELAY BASED LOAD BALANCING ROUTING PROTOCOLS

In this section, we discuss the various delay based load balancing routing protocols are:

6.1. Load Balancing Success Rate of Packet Routing (LBPSR) [12]: In this protocol a new efficient routing named load balancing which by using of the success rate of packet routing is proposed. We choose the optimal gains metric as a MAC layer and by using success rate of packet through the traffic load balancing. This protocol defines DSR method to use avoid crowd and unstable nodes which present the full time effort, some nodes that are located in the shortest path to give a better performance which we are trying to balance the load on each node are given by capacity.

6.2. Node-Centric Load balancing Routing Protocol (NCBR) [11]: This protocol is similar to AODV. In this protocol each node will be avoided congestion. The main goal of this protocol is to prevent the formation of new routes through a node is busy and congested. The status of congestion its current size of the queue that obtain of each node.

6.3. Energy-Efficient Protocol for Load Balancing (EEAODV) [13]: This protocol to avoid the congestion we calculate the different routes with the links of stable routes. In this mechanism an energy efficient load balancing, congestion and energy consumption of the nodes is proposed. The network provides the higher obsolescence and less hop count through the different routes to a destination. In this protocol, if the intermediate node has full time to changing the queue interface nodes which has been in the reverse path to judge the length of interface at each node.

6.4. Multi-path Load Balancing Rate Based on Congestion Control (MLBRBBCC) [14]: This protocol which based on method a new multi-path load balancing and congestion control in the communication networks based on the rates. This protocol is based on the technique are studied of adaptive rate control in which the destination node, copy of the estimate intermediate nodes and RREP packet sends to a sender feedback. The estimated rate of the intermediate node sends a RREP to

the sender and based on sender rate control. At the intermediate nodes the productivity channel and queue length along path to a destination can be estimated and transmitted to a destination based on these values of congestion and rate control.

VII. TRAFFIC BASED LOAD BALANCING ROUTING

In this traffic based there are various protocols which distribute the traffic load balance in the network.

7.1. Multi-path Routing Backbone (MP-QMRB) [19]: In this protocol according to the level of the nodes which provides support of service and traffic congestion. This protocol provides a better transmission and processing for good performance in the routing process. It provides control congestion and distributed a load balance better performance through the bandwidth of the network.

7.2. Multiple Metric Based Load Balancing Routing Protocols (MM-AOMDV) [20]: This protocol define a new method of traffic by taking the three parameters which are channel load, access and remaining energy of a node in the path selection criteria. Due to better efficiency and ability of the network will be created through the low productivity of the channel routing protocol. We calculate the estimate the load by the MM-AOMDV channel access and collision rates. This protocol will select the routes with low efficiency channel access and lower collision rate per node, that node are select that has a long life with the regard of energy.

7.3. Load Balancing Routing Mechanism (LBRM) [21]: This protocol can suitable design for the load balancing and traffic distribution based on the three metrics which are battery capacity, weight values and the average number of hops along the length of queue interface to be defined. In this proposed protocol we calculate the weight among all the possible paths for each route is selected that will distribute the weight of traffic. While the using the remaining battery capacity is less than the values to give the weight to the weight in the direction which we are finding the shortest route and less congestion in the network during the initial route discovery process than is to the broadcast the RREQ packets and then transmit the packets through the selected path with the weight values.

7.4. Reliable and Efficient Load Balancing Routing Protocol (RELBR) [22]: In this protocol the proposed technique is based on DSR protocol a reliable, efficient routing and load balancing. It is based on the combined weight of the path the best routes based on their combined weight of the selected path is select. Using the variety traffic during these routes is distributed of the network coding, route cache updates and minimum weight functions can be removed from the list. In this protocol which the based on the reliable and efficient through the balance the load in the network. We calculate the estimated combined weight function by using the received signal strength metric, path length, traffic load and the residual energy is calculated through the reliable and efficient through the routing load balancing.

VIII. HYBRID BASED LOAD BALANCING ROUTING PROTOCOLS

In this protocol we can describe the various routing protocol which is the combination of traffic and delay based routing protocol.

8.1. Multiple Path Routing Mechanism (LB-AOMDV) [15]: This protocol is based on the multi-path routing mechanism which we multiple routing and distribute the traffic on the actively routing and less congestion to distribute the load balancing among all the nodes in the network. In this proposed we define a new metric which are buffer size is to provides a better to balance the load in the network.

8.2. Adaptive Multi-path Routing for Load Balancing (AMRLBC) [16]: This protocol proposed as a multi-path routes, measure routes of the various safely for a failure. We present the different path with failure of the safely which contain a node with the maximum battery power, less load balance and remaining power of battery in this routing strategy. In this protocol we distribute the traffic among the multiple path which the route are randomly congestion is to reduce the traffic load in the network

on the link through this average load in the present links will increase and the remaining battery power of the node is less than a threshold.

8.3. Congestion Adaptive Multi-path Routing for Load Balancing (CAMRLB) [17]: This protocol is based on the congestion on the multiple path of the routing path to avoid the congestion in the network. We define the metrics in this algorithm that calculate the available bandwidth, estimated load balance and estimated remaining battery power. The traffic over the different routes pass from the path which the safely failure in order to reduce the traffic load on the link is a congestion distribution through the traffic load in the path. Through the average link on the load balance increases beyond the threshold defined and the bandwidth available and reduce the energy battery power remain under the threshold.

8.4. Load Balancing in Genetic Territorial Routing Protocol (GZRP) [18]: This protocol is an genetic territorial routing protocol is an extension combining the routing protocol ZRP by using of genetic algorithm GZRP in the combination of this algorithm in IERP and BRP are the part of the ZRP, it represents the limited collection of the paths for the destination in order to the network load balance and the stability during the link node in the processing of the path. It gives the better result in comparison with the ZRP scale. In this proposed the alternative path of this algorithm with the genetic activity according to the network of the topology data, to reduce the path from end-to-end correlation and delay through the preservation moderate paths in the network. Genetic pocket distribution arte used to several paths for balance the network which this GZRP like ZRP this destination node acts within the zone of the routing source nodes or schedule the routing to improve the according the mobility and the route criteria selection.

IX. CONCLUSION

There are various protocol we study in this paper that the routing problem in this mobile ad hoc network is an issue of the load balancing to select the multiple paths and to distribute the load is very important of the network. Load balancing is the optimal resource utilization, maximum throughput, minimize response time and to avoid the congestion. Most of the load balance is choose an appropriate metric in order to choose a path to better performance in the network. So DSR and AODV is the traditional protocol is the traffic based routing protocols. We choose a multiple metrics considering that the traffic load and use a multi-path routing can improve the better network performance. Hence, load balancing routing protocols using the different metrics to the traffic distribute the load among the network nodes chosen a number of hops, buffer size and battery power remaining.

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Param-eters	Routing Path	Proto-col	Routing structure	Interfa-ce queue
LBPSR	Single	DSR	Reactive	Yes
NCBR	Single	AOD-V	Reactive	Yes
EEAODV	Single	AOD-V	Reactive	Yes
MLBRBCC	Multiple	AOD-V	Reactive	Yes

Table 1: Compares the Delay Based Load Balancing Routing Protocols

Param-eters	Routing Path	Proto-col	Routing structure	Interfa-ce queue
MP-QMRB	Single and Multiple	QMRB - AOM-DV	Reactive	No
MM-AOMDV	Multiple	AOM-DV	Reactive	Yes
LBRM	Single	AOD-V	Reactive	Yes
RELBR	Single	DSR	Reactive	Yes

Table 2: Compares the Traffic Based Load Balancing Routing Protocols

Param-eters	Routing Path	Proto-col	Routing structure	Interfa-ce queue
LB-AOMDV	Multiple	AOM-DV	Reactive	Yes
GZRP	Multiple	ZRP	Reactive	Yes
AMRLB-C	Multiple	AOM-DV	Hierarachi-cal	No
CAMRL-B	Multiple	QMR-B	Reactive	Yes

Table 3: Compares the Hybrid Based Load Balancing Routing Protocols

