Dynamic strategy for Organizing & distributing Load Balancing in MANET

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Abstract : MANET Stands for "Mobile Network." A MANET ad-hoc network can able to change its locations, places and arrange itself based on the fly. Since MANET's are movable &mobile, they utilize wireless based connections networks. be Wi-fi connection, or any another medium and a cellular or satellite transmission.

Load balancing is necessity of any given multi-hop wireless network. A wireless routing protocol is utilized based on its ability to deliver &distribute efficient traffic over the network nodes. The routing protocol accomplishes this without presenting an unacceptable postponement. The preeminent evident advantage is showed in expanding the lifetime of a battery-worked hub which may inevitably build the life span of the en-tire network. Endeavor of identifying the shortest distance among any two network nodes to deliver data fast, nodes has been become the efficient picks. The centrally nominated nodes can able to access or connect more sub networks and respective gateways to some of the sub networks which can become distributed from the respective network node in absence. Thus, the network lifetime of given nodes has becomes a popular bottleneck for the reliable connectivity of a given sub network its distributed from its network. With out biasing the load can cause the network congestion which majorly impacts the final throughput, packet delivery ratio, and average end delay. In, this mitigated the unbiased load distribution on centrally located nodes by pushing traffic further to the peripheral nodes without compromising end delay for greater network longevity and performances. We proposed routing metric, load and a minimization criterion a path that involves nodes with less load burden on them. The simulations of the proposed mechanism run on NS-2.34for 16 and 75 nodes have revealed 2.46% reduction of load on the centre node with AOMDV.

Index Terms - AOMDV, Current Multi-path Routing, ACO, Load Balancing, MANET's.

1. INTRODUCTION

Mobile Ad-hoc Networks are multi hop networks where nodes can be stationary or mobile; and they are formed on a dynamic premise. They permit people to perform assignments efficiently by offering unprecedented levels of access to information. The distribution of the nodes in the MANET play a vital role.
The major characteristics are denoted as follows:
1) The topology used in this is highly dynamic and as well as random and hard to predict.
2) MANETS are worked based on the wireless links which can have lower capacity than the wired networks.
3) MANETS consists of less physical security.

Mobile ad-hoc networks are majorly affected by larger loss rates, and those are present in the higher delays and jitter than fixed connection oriented networks due to the wireless transmission; and Mobile ad-hoc networks nodes mostly rely on batteries or other reliable energy. The energy saving in the wireless networks is a major criterion and the nodes has been of power aware. Based on the availability of the nodes a set of functions can be offered.

Routing can be addressed by research. The routing can't be fixed due to nodes are moving independently, so we can't provide a fixed connection between the nodes. To a network a node can able to join independently and they may leave randomly.

The paper has been organized as follows. In section 2, literature review which is related work. And section 3 consists of system model and section 4 have node architecture and section 5 consists simulation results and section 6 presented with the references.

2. RELATED WORK

Sandeep stated that routing can be performed by available nodes with the help of limited number of resources, load must be most efficiently and reliably delivered and distributed over the corresponding network. Instead, hugely-loaded network nodes can build a bottle neck which can minimizes the performance of a network through the congestion and as well as larger network delays. In this he stated regrettably, the known load related balancing can be a crucial deficiency performed in the MANET shortest -path based routing protocols, we have the nodes with the center of available network are largely-loaded than other [2]. Manoranjan says that with the help of effective routing protocol we can identify distance between the two nodes which can be helped to maximize the lifetime of a node and we can easily find out the shortest distance between the nodes[1].

Sina Keshvadi proposed that Multiple Agent located Load based Balancing Algorithm (MA) has to shift the given load to the corresponding IaaS to attain good and dynamically vary load based balancing through the virtual machines to increasing the usability. To Perform the sender-initiation and receiver-initiation strategy for balancing the given load for an respective IaaS in this way amount of node waiting time for the performed tasks loaded in the queue line is very nominal which knows that the specific SLA is guaranteed[3].

J.Zhang explained that a multi-Agent rated load distribution to balance the given model is explained for cloud based platform, which can uses effective workload to predict the technology and therefore threshold buffering methods to minimize the VMs. Experiments results represents that the method can able to significantly minimize the workload reliable data transmission and effectively solve the periodic migration analysis, which will be productively attain load balancing, encourage the usability of the entire specific data center through resources[4].

S.Yin explained that Disseminate traffic equitably between the network mobile relative hosts which is accessible to order the total advantage for the given distinct limited available resources in the MANET. However, prevailing the given routing protocols which do not consider the load balancing. Here, we implemented a load vary balancing strategy which known as multi path load adaptive balancing (MLAB). Our objective is to spread the traffic between the multiple paths through dynamically, by considering evaluation of path relative statistics, which will be used to network node resources that will be better so congestion of a node and also end-to-end delay of a network are reduced[5].

3. SYSTEM MODEL

3.1 Routing

Routing is the way of choosing a path for distributing the traffic in a network or over multiple distinct networks. Extensively, routing is executed in multiple kinds of networks, which including circuit-exchanged networks. For example public switched based telephone network(PSTN), PC's, computer networks. For example Internet.

3.11. Single Path Routing

Single-Path protocols learn distinct routes and choose a single finest route to every destination. Such as these protocols are unequipped to load balancing in traffic. A case of a single-path protocol is caliber Border Gateway Protocol(BGP). BGP can be publicizing single finest to known destination. Which will be only permits a single path for the destination according to the IP routing table. However, today there is BGP Multi path, which permits BGP to distribute load balancing with the help of creating equal number of cost paths.

3.1.2. Multi path Routing Protocol

Simultaneous multiple path routing (CMR) is frequently interpreted to meaning the concurrent management where the utilization of numerous accessible paths to the transmission of floods of information. The streams might be excluding from a one application, or various applications. A stream is appointed for a different path, as unparalleled possible number of paths accessible. (In the event that there are a greater number of streams than accessible paths, a few streams will share paths.) This gives better use of bandwidth by making various transmission queue lines. It gives fault tolerance in that should a path failure, only the traffic allotted to that path is influenced or affected.

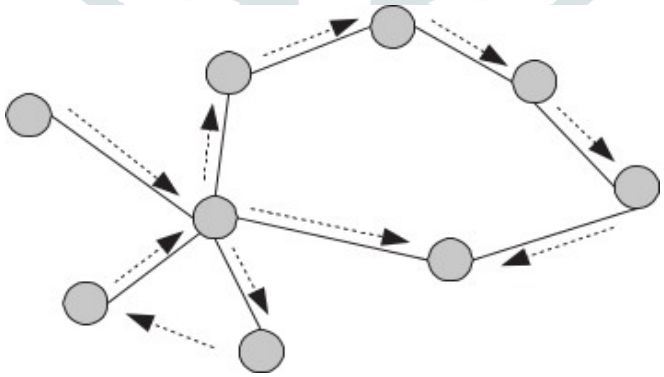

FIGURE 1: With the multiple path computation a potential routing protocol.

3.2. Load Balancing

As the name demonstrates were needed to adjust the load in a corresponding network but what if does distributed load can balance mean in the context of wireless networks? Load means to the traffic or the data packets of a network node will be forward to the respective links which will be delivering to the corresponding destination. The load balancing on the other hand to distribute load among the nodes in a specific network which would be in unbiased manner. This represents that no node in the particular network should be burdened to delivery huge packets than other nodes until the situation has been demands. The local Load imbalance for a network is mainly attributed to the corresponding routing protocols and the represented way in which they pick up

the respective valid network related source-destination paths. The routing protocol not only consist reliable throughput and less latency but also strives in particular distribution of the load. When load can be not balanced it involves unnecessary node delay in respective packet delivery , which can be increases packet drop ratio , and also affects the overall network throughput , which can be prunes a node's lifetime in the network. Distributing the network which becomes a major reason to increase the congestion.

3.3. AOMDV Protocol

AOMDV known as Ad-hoc On-demand Multiple path Distance based Vector Routing protocol. The AOMDV is the augmentation for the AODV protocol. In AOMDV approach based protocols has multiple distinct routes can be founded among the source node present in the network and destination node. Which utilizes another routes while route failure. In the AOMDV approach based protocols which can be new route discovery which will be needed when the routes are fail. In AOMDV approach based protocols multiple path routing can be enhancement to the uni path based routing advantage is to handle to balance the load in network which can avoids the congestion and also increases reliability.

3.3.1. AOMDV Advantages:

- It establishes route discovery on demand.
- For free nodes it will creates the loop.
- It maintains reliable connection between the nodes.
- Speed and significant recovery when node failures occurred.

3.3.2. AOMDV Disadvantages:

The major disadvantage of utilizing AOMDV is which can have huge message delivery overheads while processing the route based discovery because of maximizing the flooding. Which is multiple path recurrent based routing based protocol, the noted destination which relies according to the multiple occurring RREQs which results through a wider overhead denoted packets where the response for a single occurred RREQ packet delivery may cause to huge control node overhead. The abstract of the MANET has received the efficient notice in each and every discipline of Information Technology industry. The nodes present in the Mobile based Ad hoc networks which will be continuously moved to lead the randomly changing strategy which can be further causes to huge problems and the link has to be breakages which cause loss of the packets those are sent from the source node in the network to the destination node. AOMDV approach based routing protocol help to Manets.

3.4. SERVICE CONSTRAINTS:

By considering the execution time, latency, response time, transmission time, W3C performance is to be defined. Service performance can be denotes that how faster the given service can be completed. In this paper we are considering the throughput and response time are the two major constraints.

3.4.1 Throughput:

Throughput can be defined as number of requests to be completed in a given time is calculated as throughput.

$$Throughput\ (s) = \frac{\#requests}{time} \quad \text{(Equation 2)}$$

3.5 NODE QoS CONSTRAINTS:

We are considering two parameters to calculate the corresponding performance of a service such as energy and hop count.

3.5.1 Energy consumption for a network node:

Energy consumption has been done when the packets has been sending from available network node location to another network node location. Energy consumption of a node can be equally denoted as E (p, n_a) and this is the required energy necessary to delivery a specific packet (p) to particular node n_a to required node n_b.

$$E(p,n_a) = E_{tx}(p,n_a) + E_{rx}(p,n_b) + (N+1).E_o(p,n_i) \quad (3)$$

Energy consumed by each node is calculated as

$$E_{Node} = E_{ack} + \sum_{i=1} Cost_{Ei}$$

$$E_{ack} = n \times E(p, n_a) \quad (4)$$

Where

n represents the number of controlled packets and E_{ack} represents the time utilized for the processing of corresponding data in protocol stacks of given source, destination, and also the intermediate nodes, cost E_i can be denoted as the cost incurred for various mobility constraints and E_i denotes the processing of node movement, resources, service discovery and bandwidth.

3.5.2 Hop Count:

Hop count defined as the distinct number of links or hops to be presented in middle of the source and as well as destination node can be stated as hop count. The Average to number of hop count can be denoted as for overall communicating the nodes in MANETS to evaluate the specific average shortest path by varying the hop count at every point of time. For this we utilize the multi-hop based connectivity matrix

Hop count h is

$$h = \frac{\sum_{i=1}^{T} hops_i}{\sum_{i=1}^{T} paths_i} \quad (5)$$

Where

T denotes number of distinct multi-hop matrix

$hops_i$ = at time I total number of distinct hops

$paths_i$ = At time I, number of cells having the non-zero entry.

When the s2 service to be present this will continues until the service composition path to be established and the results can be transferred to service compositor. For example let us consider the matrix for representing the rating for different services.

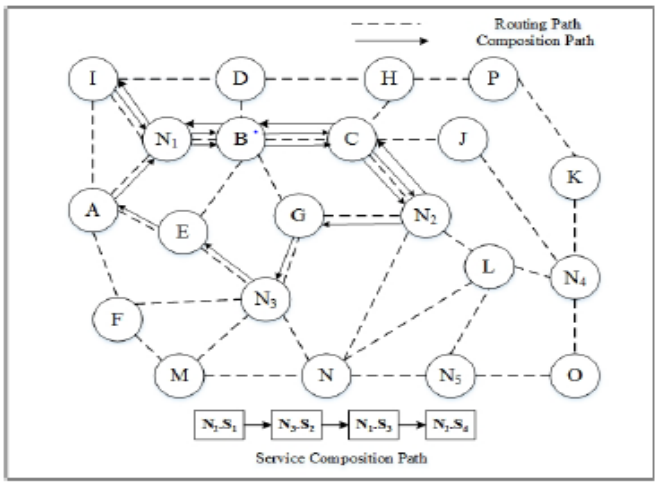

Figure 2: service composition path

4. NODE ARCHITECTURE:

As shown in figure 5 the node n1 consists of three services such as s1, s2 and s3. Node n2 consists of two services i.e., s1 & s4. Node n3 consists of services s2 & s4. Node n4 consists of services s1 & s2. Node n5 consists of services s1. Among these services s1 can selects node n2 because that can have maximum rating and s2 can selects node n3, service s3 can selects node n1, and finally service s4 can selects node n2. The composition path to be like n2->n3->n1->n2.

5. SIMULATION RESULTS:

The major simulation parameters that we used to implement the model which corresponds to organize the load balance and distribute the nodes to the corresponding network can be represented as below.

Parameters	Values
Area	$1000 \times 1000\ m^2$
Channel	Channel/WirelessChannel
Network interface	Phy/WirelessPhyExt
MAC interface	Mac/802_11
Number of mobile nodes	400
Mobile speed range of nodes	[1, 30] m/s
Simulation time	200 s
Signal range of mobile nodes	200 m
Default distance between server and nodes	6 hops
Transmission protocol	UDP
Wireless routing protocol	DSR
Interface queue	CMUPriQueue
Bandwidth of server	20 Mb/s
Bandwidth of mobile nodes	10 Mb/s
Transmission rate of video data	128 kb/s
Travel direction of mobile nodes	random
Pause time of mobile nodes	0 s
p	2
q	3

Table 3: simulation set up

5.1 Simulation time vs. end-end delay

`The below figure displays the results based on time and end-end delay was represented as below. The AOMDV routing protocol which gives maximum throughput. The below represented graph shows that as the time increases then the throughput of the given routing protocol also increases. The evaluation results of the proposed AOMDV strategy based routing protocol has been contrasted with the LBEA-AOMDV strategy based routing protocol the proposed method gives the effective and efficient results.

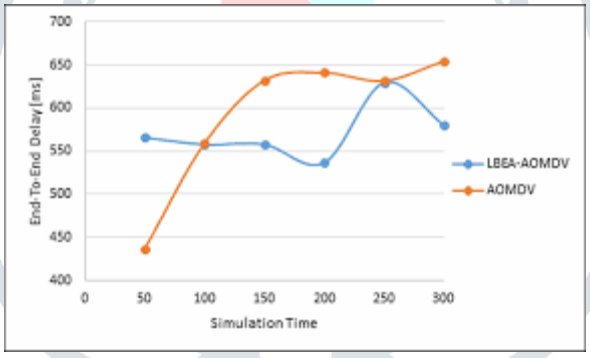

Figure 3: Simulation time vs end to end delay

5.2 Node Id vs Forwarding Packets

In figure 4 we shows that The below graph represents that allocation of nodes with respect to the load in the network. As the load in the network increases then node id will also be changes else we can allocate the node to the corresponding network. The major task is to manage the number nodes according to the load.

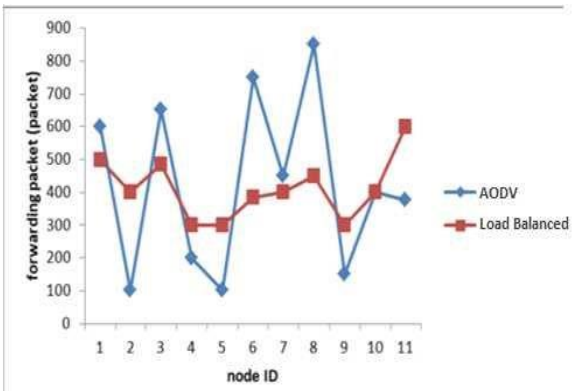

Figure 4: Node Id vs Forwarding Packets

5.3 Node Energy vs Distinct Number of services

In figure 5 shows Node energy vs distinct number of services between the proposed work and AODV protocol. In proposed method it consumes less energy because it uses service constraints and results increases network life time of a network.

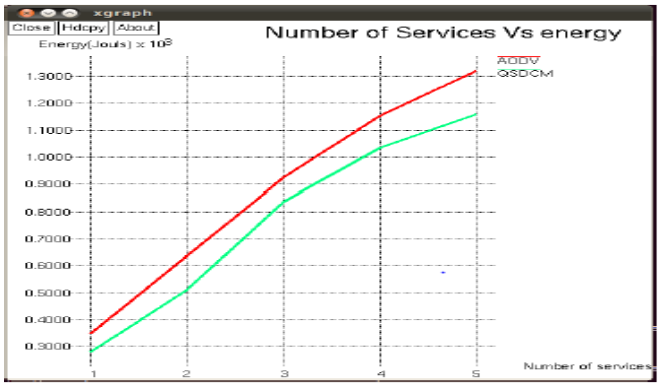

Figure 5 : Energy versus number of services

6. CONCLUSION AND FUTURE WORK:

With the help of load balancing we increases the network lifetime which helps to provide the maximum throughput, in order to increase to packet delivery ratio. The major parameters that we considered in our work is throughput, response ratio, hop count. The AOMDV routing protocol which helps to find the shortest-distance among the nodes. By evaluating the shortest distance between the nodes which helps to increase the delivery rate.

In future work we are planning to consider the fault tolerance parameter which helps to reduce the number of fault rates in the network. And also we can use the ant colony optimization to discover the shortest path.

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