Multipath Routing Technique in Wireless Network Based on Optimization Algorithm

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***Abstract* – Mobile Ad Hoc Network environment with remote system framework and this innovation is created to give better system experience superior and quality. Try to eliminate the congestion by congestion control algorithmsis process of reducing the rate at which the source nodes inject packets into the network. It requires Router mechanisms designed to achieve rationalbandwidth ratio, like Fair Queuing, have many necessary properties for congestion control. However, such mechanisms generally need to preservesituation, manage buffers, and perform packet scheduling by flow basis. In proposed system packet flows handled by the entry router, it limits the node rate and distance between nodes. The source node definite which intermediate node to be transfer next. In this method use Improvised Optimization to determine node rate and path from source to destination.**

Keywords – MANET, Congestion, Node Rate, FQ, Queue Optimization.

I. INTRODUCTION

The wireless communication technology isplaying an increasingly important role in data networks.Wireless networks are usually connected to the internet via backbone gateway routers. The packet loss mayoccur at fusion points that connect the backbonenetwork to the wireless networks. The Internet protocolstructural design is based on a wireless end- to-endpacket service using the IP protocol. The advantages ofits wireless design, flexibility and stoutness,have been fullyestablished. However, these advantages are not without cost: design isrequired to affordhigh-quality service under intense load. Infact, requiremore attention to the dynamics of packetforwarding can result in severe provision degradation or"Internet meltdown". Congestion control problemoccurs when the demand on the network resources isgreater than the available resources and due toincreasing mismatch in link speeds caused byintermixing of heterogeneous network technologies.This congestion problem cannot be solved with a large buffer space [1].

MANET is a self-governing passing relationship of versatile hubs that speak with one another over remote connections [2]. Hubs that exist in one another's send range can impart straightforwardly and are in charge of progressively finding one another. With the end goal to empower correspondence between hubs that are not straightforwardly inside one another's send go, middle of the road hubs go about as switches that transfer bundles created by different hubs to their goal [3]. These hubs are regularly vitality obliged gadgets with an extraordinary assorted variety in their capacities. The gadgets are allowed to join or leave the system and they may move arbitrarily, perhaps bringing about fast and flighty topology changes [4]. In this vitality obliged, dynamic, conveyed multi-jump condition, hubs need to sort out themselves powerfully with the end goal to give the vital system usefulness without settled framework or focal organization. As MANETs are categorized by a multi-hop system topology that can alterregularlysuitable to mobility, efficient routing protocols are obligatoryto establish communication conduit between nodes, without causing extreme control traffic overhead or computational burden on the power constrained devices [5]. Multicast routing [6] plays a critical role in most of the new applications such as webbase learning, video conference, and interactive multimedia games. Multicast directing in MANET represents a few difficulties because of inborn qualities of the system, for example, hub versatility, dependability, and rare assets. The fundamental trouble in structuring a steering convention for versatile specially appointed systems is the progressively evolving topology, because of the irregular development of portable hubs.Moreover, security [7] has become a primary concern to provide protected communication between mobile nodes in a hostile environment. Min-power asymmetric multicast routing [8] is able to give energy efficient routing using the constant approximation Steiner algorithm with an approximation heuristics. The network coding [9] is another response for routing in multicasting that is skilled by a graph made of tree structures looking out for physical present joins. The base significance multicasting [10] compelled the total cost of the consumed bit rates on the edges while giving a unit multicast rate.

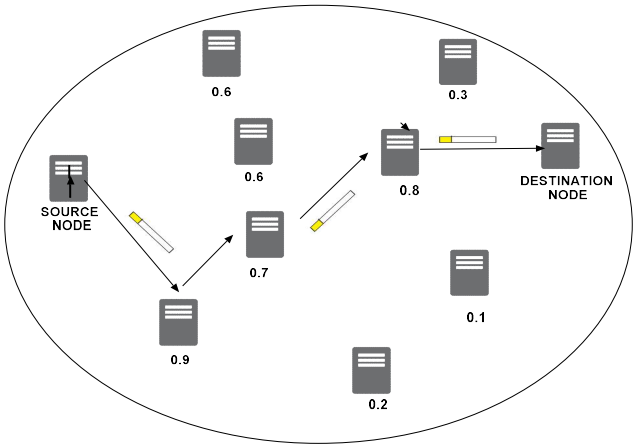

Fig.1: Network Model

In this paper we use optimization algorithm and queue method in MANET architecture to avoid congestion.Ad hoc networks are self-organizing wireless network, which do not rely on fixed infrastructure or on predetermined connectivity. Mobile Ad-hoc Networks (MANETs) are composed of a set of communicating devices which are able to spontaneously interconnect without any pre-existing infrastructure [23] [25]. Mobile ad hoc networks (MANET) are the infrastructure- less networks where the nodes keep moving randomly at varying speeds that result in continuously changing network topologies. This paper mainly emphasised the congestion problem and the main techniques used for it [24] [25].

II. RELATED WORK

The Internet has become the most important transport medium for people to shareinformation. Bandwidth is the most criticalresource in the Internet. Although theabsolute volume of bandwidth in today'sInternet has increased dramatically, thedemands have increased even faster, becausepeople tend to put more and moresophisticated types of information onto theInternet. In the modern day Internet, there has been a strong demand for QoS and fairness among flows. As a result, in forced to play an active role in congestioncontrol and avoidance. Some AQM schemesthat have been proposed include RED [11] [12], SRED [11] [13], REM [11] [21], a virtual queue based AQM [11] [22] scheme. Besides the bandwidthmetric, some other Quality of Service (QoS) requirements, such as delay, are alsobecoming more and more important for such new applications.

Yadav et al. [15] have made an Efficient Fuzzy based Multi-constraint Multicast Routing Protocol (EFMMRP), which resuscitates the QoS execution restraints are end-to-end delay, channel transmission capacity and energy with the use of fuzzy logic. A multicast routing provides facility of sending information from one source to group of destinations for such applications requires group communication such as real time audio and video for news entertainment. This protocol calculates fuzzy cost for every link. In this protocol, the route with smallest fuzzy cost is considered as the optimal and feasible path for the transmission of data. EFMMRP is very expensive and not negligible sensitive cost with the likelihood of immaculate way and the data to be transmitted over in this way from source center point to an arrangement of recipients.

Parthiban et al. [14] have proposed a hyper-geometric trust factor based Markov prediction mechanism (HTFMPM) used to resist the malicious attacks in the multicast routing. Here, nodes can move freely in the network, there is no such a clear line of defense. Some of the nodes may be compromised by the adversary and thus perform some malicious behavior that are hard to detect. The lack of centralized machinery may cause some problems when there is a need to have such a centralized coordinator; restricted power supply can cause some nodes to behave in selfish manner and continuously changing area of the network.

The proposed "Congestion Control using Queue base approach as well as Multipath routing under MANET" that provide lowest amountof operating cost as well as minimum end to end hold-up and enlarge the packet delivery ratio. Here we describe related work in multipath routing for minimization data drop. We also describe about problem statement and working tool

Congestion control: It is necessary to change the data rate used by each sender in order not to burden the network, where numerous senders compete for link bandwidth. Packets are dropped when they arrive at the router and cannot be forwarded. Many packets are dropped while extreme amount of packets enter at a network bottleneck. The packets dropped would've travelled long way and in addition the lost packets frequently trigger retransmissions.

This associates that even more packets are sent into the network. And so, network throughput is still more worsened by the network congestion. There are chances of congestion collapse where almost no data is delivered successfully if no appropriate congestion control is performed [16] [17].

Shared broadcast medium is implementing in mobile ad hoc networks. Intermediate capacity which is very insufficient is mutual within all the nodes in a conflict domain. Whereas delivering data to compound destinations, multicast communication is of great concern in these networks, since it helps saving resources. Group communication which is an inherent feature of many proposed applications in MANETs is added to this broadcast medium. So, it is important to avoid congestion collapse in wireless multi-hop networks in order to perform efficient congestion control [16] [17].

Most of the existing algorithms try to eliminate the congestion problems. To avoid congestion various efficient Fair Queue algorithms are used. The problem of existing method increased complexity of architecture, so delay occurred in data transmission.

Our proposed method use PSA and Fair queuing technique.In this paper focusedboth congestion and complexity of network. To reduce complexity of data transfer first to regulate the flow of packets, that process managed by improvised optimization algorithm. The algorithm determines node cost that will give node signal strength and distance of the nodes form source to destination.

III. PROPOSED METHODOLOGY

Proposed methodology of a routing protocol is improvised optimization. The routing protocol algorithm has two steps first to the node cost is calculated by the mobile node metrics such as energy consumption, mobility, received signal strength, and overhead. Second compute the route between source-destination by the improvised optimization algorithm.

The source node is sending the packet to destination in wireless networks. The entry node first detect intermediate nodes energy consumption, mobility, received signal strength. Improvised optimization algorithmprovidesboth the transmitter and the receiver energy prerequisites are considered in the energy structure. The wireless nodes' energy consumption is relied on the volume of data and length of transmission.

The source node selected the path depends on the node cost and energy consumption. So source transfer packet to intermediate node with high node cost and then intermediate node transfer packet refer to the packet label depends on that packets are transmitted.

The generalized formula for energyconsumption with respect to intermediate node and receiver node is as follows

$$E_{total} = FFE(n,\ d) + FRE(n) \quad (1)$$

Where $FFE(n, d)$ and $FRE(n)$ are energy consumption of intermediate and receiving node.Received signal strength is relied on two parameters namely distance and transmission energy. If the node transmits frame/packet with energy $FFE(n,d)$, the nodes received signal strength, with the distance of D, can be expressed as follows:

$$RSS = \frac{FFE(n,d)}{4\pi D_i^2} + T_{a,a_1/a_2} \quad (2)$$

Here, we utilize Rastrigin's [18-20] capacity for flourishing estimation and outline as takes after:

$$F_{opt} = \sum_{i=1}^{n} \left[p_i^2 - 10\cos\left(2\pi\, \mathrm{p_i}\right) + 10 \right] \quad (3)$$

This function provides a mean to determine the exact accurate near value of the MANET. The solution for both minimization as well as maximization problems can be obtained using the proposed algorithm.

In order to obtain the new value of $P'_{n,m,i}$, computation could be done using the following equation

$$P'_{n,m,i} = P_{n,m,i} + r_{1,m,i}\left(P_{n,b,i} - \left|P_{n,m,i}\right|\right) - r_{2,m,i}\left(P_{n,w,i} - \left|P_{n,m,i}\right|\right)$$

(4)

Where,

- $P_{n,m,i}$ is the existing value of n^{th} variable for the m^{th} candidate during i^{th} iteration.
- $r_{1,m,i}$ and $r_{2,m,i}$ are the random numbers between 0 and 1

- $P_{n,b,i}$ hold the value of the variable n to report an outstanding applicant
- $P_{n,w,i}$ hold the value of the variable n to notify an unfavorable candidate.

In F_{opt} the row with the minimum value signifies the best candidate among all.

A. Improvised Optimization Algorithm:

Input: m population size, n control aspects
1. Begin
2. for i=0 to m
3. Initialize the control values P as P(1), P(2), P(3),…P(n)
4. Compute initial value by using equation (5)
5. end for
6. for i=0 to n
7. for i=0 to m
8. compute new solution(P^{l}) using equation (6)
9. if P^{l}>P
   P=P
   Else P=P^{l};
10. End if
11. End for
12. End for
13. Return: intermediate nodule information

The algorithm returns node information that is passed to source node. Next intermediate node follows source nodes instruction by Fair queue method.

Fig.2 shows a flow of algorithm first user send a packet to source node. The source node process by optimization algorithm it finds a node rate, energy consumption and distance between the nodes. After that source node add a labels to the packets that has path way to destination. Optimization algorithm provide traffic free path node to avoid congestion. Follow the labels packets are transfer intermediate node and finally reached the destination node.

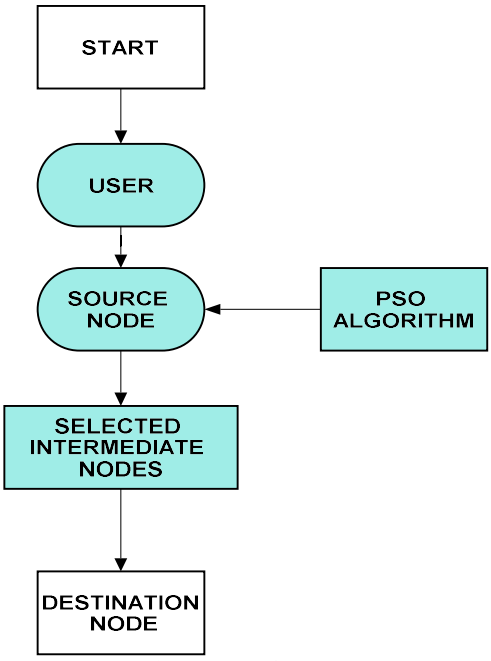

Fig. 2 Proposed System

A. Packet Delivery Time

Packet delivery time is calculated by difference between delivery and send time.Fig. 3 demonstrates the packet delivery time of FIFO, weight fair queue and Optimization. In proposed method delivery time less compared to others because complexity of path simplest by optimization algorithm.

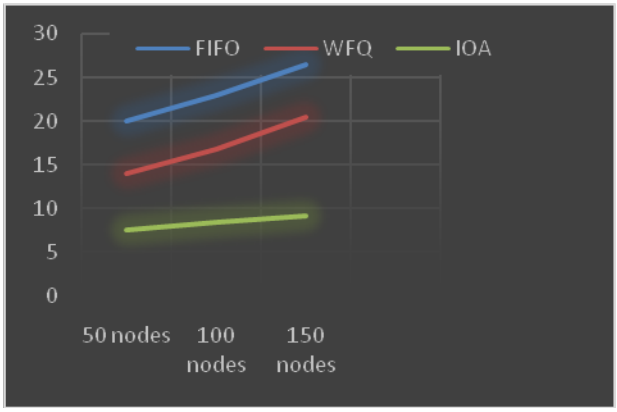

Fig. 3: Packet delivery time

B. Security

The proposed model has the highest security compared with Fair Queuing techniques. The reason is source node in improvised optimization algorithmand intermediate node transfer data with stack queue method. So there is no chance to congestion and delay of packets. Because of this process there is no loss simultaneously data securely send to the destination node.Fig. 3 demonstrates the security level of proposed algorithm compared to the Fair Queue algorithm with different set of nodes.

Fig. 4: Security level Comparison

IV. CONCLUSION

In proposed algorithm is Improvised Optimization method. Improvised optimization algorithm is a routing protocol to provide congestion free MANET architecture. In this paper improvised optimization algorithm applied at source node that node select the path for packet transmission depends on the algorithm result. Intermediate nodes transmit the data packet in balanced queue manner. The algorithm used at source node because decayed the complexity of architecture, if complexity is increased congestion occurred like buffer and loss of packets. So proposed algorithm reduced complexity, packets are easily send to destination without any congestion.In future we have to deploy the proposed work for changing new routing protocol.

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