Novel Approach for Path Recovery in Mobile Ad hoc Networks

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Abstract— The mobile ad hoc network is the decentralized type of network. The AODV is the efficient protocol for the path establishment from source to destination. The path from source to destination is recovered on the basis of node connectivity. To maintain quality of service in the network, the buffer size parameter is added in the link recovery approach. The proposed approach recover the path from source to destination efficiently and also maintain quality of service over the network. The proposed algorithm is implemented and compared with existing in terms of certain parameters.

Keywords: AODV, DFCP, Buffer Size

I. INTRODUCTION

Wireless networks are the kind of networks in which the interaction amid equipments is executed in the absence of wiring arrangement. Radio waves and microwaves are utilized for performing communicating amid equipments in wireless networks. The both equipments with communicate with each other lies within the radio range of one other. The 802.11 is the IEEE standard for wireless networks. Several features of wireless networks are movement of nodes, ease and extremely reasonable and economical deployment. Wireless networks can be categorized into two kinds:

- Infrastructure comprising network
- Infrastructure-less or Ad-Hoc networks

A wireless ad-hoc network comprises a compilation of "peer" movable nodes which are able to communicate with one another in the absence of a permanent framework or any central management. These networks do not use any fixed framework or base station for interaction. All nodes themselves act as router for sending and accepting packets to/from other nodes. A mobile ad-hoc network (MANET) is a self-configured type infrastructure-less network which consist movable nodes linked by wireless arrangement. Every node in MANET is open to move autonomously in several directions [3]. For this purpose, these nodes vary their connections to other nodes regularly. Every node should onward passage unconnected to its individual usage and thus becomes a router. The main difficulty in constructing a MANET is the deployment of every node which is required for the continuous transmission of information necessary for the proper routing of passage. Mobile Ad hoc Network (MANET) is a compilation of autonomous movable nodes which can communicate to one another by means of radio waves. The movable nodes which lie in the radio range of one another can interact in direct manner, while other nodes require the help of intermediary nodes for the routing of their packets.

A. Characteristics of MANETs

The different characteristics of MANET are given below:

1) In MANET, the mobile nodes can perform the role of both the hosts and routers.
2) This mobile ad-hoc networks comprise dynamic network topology and regular direction-finding information
3) These networks can be deployed at any place as these networks are infrastructure less networks.
4) In MANET, the mobile nodes can move independently, hence no framework is required.
5) Energy Constraints. Power consumption is the main issue present in these kind of networks. Therefore these networks are also called as energy constrained kind of networks.
6) In MANET, restricted safety is provided for information transmission.

B. Classification of Routing Protocol

The maintenance of routing or direction finding is considered the one of the most significant and tricky in ad hoc networking [4]. An ad hoc routing protocol is nothing but an accord amid mobile nodes as how they manage the routing of packets amid themselves. The mobile present nodes present in an ad hoc network determine paths because they contain any previous information about the network topology. Routing protocols in MANETs are categorized into three dissimilar categories on the basis of their functions:-

1) Reactive Protocols:

These protocols are also recognized as On Demand routing protocols. These protocols do not retain direction-finding or routing behavior at the network nodes in the absence of interaction. This implies that these protocols establish the paths only according to the need of source node. If a node wishes to forward a packet to other node, then this protocol discovers the path on the basis of demand and creates the link for sending and receiving of packet. In this protocol, the source node starts the path detection stage. In this manner, these protocols are identified as source routing protocols as well. Paths are added to the table once the Route Reply packets initiated from the target arrive at the source through different senders. Some examples of reactive routing protocols are DSR (Dynamic Source Routing), AODV (Ad hoc On Demand Protocol), TORA (Temporally-Ordered Routing Algorithm) etc.

2) Proactive Protocols:

This protocol upholds the routing information even before its requirement. They try to maintain the revised information from each node to every other node in the system. The information about route is usually placed in the routing tables. This information is updated sporadically according to the change in system topology. Proactive routing protocols are considered as table driven routing protocols. The paths or routes are restructured regularly. While a node wishes to route packets to some other node, then it utilizes a previously obtainable path. These protocols uphold paths to all probable targets although some of the paths cannot be required. Each node in the system sustains slabs of paths and when the network topology transforms, revised information is forwarded crosswise the system. The most common kinds of the proactive routing protocols are destination sequenced distance vector (DSDV) routing protocol and optimized link state routing (OLSR) protocol.

II. LITERATURE SURVEY

Hesham A, et.al (2018) proposed a new power and load conscious node-disjoint multiple paths approach [9]. The major aim of proposed approach was the enlargement of standard life span for every node during the adjustment of whole power utilization through the reasonable allocation of loads amid all the nodes in the system. The execution of DSR protocol in network simulator 2 had been modified for including the proposed approach and identified as Energy and Load Aware Dynamic Source Routing protocol (PLA-DSR). With the help of network simulator 2, two tests were performed for comparing the performance of PLA-DSR approach beside pure DSR. The first test was based on power and load conscious allied performance metrics. In the second test, the performance of PLA-DSR approach was verified beside pure DSR and ED-DSR approaches on the basis of power and holdup conscious linked performance metrics. The experimental results demonstrated that PLA-DSR approach gave better performance in increasing the network's lifetime without considering the load. The tested outcomes also discovered that systems which utilized PLA-DSR in the form of routing protocol illustrated a superior capacity for nodes mobility over those who utilized pure DSR. In future, this scheme will be applied in wireless sensor networks and will execute in Network simulator.

Rachida Aoudjit, et.al (2013**)** stated that mobile ad hoc networks contained openly movable nodes [10]. These nodes were not merely accountable for the transmission of packets towards other nodes but could perform wide-ranging calculations as well. The most complex constraint present in these networks was the noteworthy difference of dispensation and power ability amid the nodes that induced a load inequity. Therefore, exchange of the load amid the congested and inactive nodes was necessary in ad hoc networks. In this study, a novel load balancing algorithm was proposed. This algorithm was based on the clustering where a division of cluster heads was chosen for maintaining some balance inside their particular clusters while diminishing the general interaction overhead. Their main objective was the minimization of the whole implementation time utilized for the completion of tasks by allocating the workload amid nodes. One more aim was the enlargement of the congested node's life span by comprising the steadiness of the system. The tested outcomes demonstrated that system performance was enhanced by the allocation of load to inactive nodes existing inside the system.

Gagandeep Kaur, et.al (2014) proposed a power competent dynamic queue approach which utilized load stabilization [11]. In mobile ad-hoc network, a routing protocol was used for the transmission of the packets towards target in the best proficient way. A routing protocol named Ad-hoc multipath routing protocol (AOMDV) with load bathe scheme was utilized for the equal distribution of traffic across the network in order to reduce packet loss. This study was motivational in various manners. An energy based Ad-hoc multipath routing protocol (E-AOMDV) was used. In this protocol, an energy dynamic threshold value was described. The life time span of the projected E-AOMDV was restricted but routing was better in comparison with AOMDV protocol which did not consider energy feature. The tested outcomes indicated that the performance of projected approach was better besides the restricted network life span.

Prof. S.A. Jain, et.al (2012) presented a brief review of the ad-hoc links, which opened numerous prospects for MANET applications [12]. In ad hoc network, the nodes were mobile in nature and no central control was present. The proper routing of packets was imperatively important in mobile ad hoc network. These networks worked very well with comparatively smaller arrangement. These networks were applicable for animatedly extended system as well. In MANET, the direction-finding was the largest constraint. The movable nodes in MANET comprised inadequate broadcasting ability. Therefore, multi hop relay was used for intercommunication. Multi hop routing faced various difficulties like incomplete wireless bandwidth, small node energy, animatedly altering system topology and high susceptibility towards breakdown. But one of the problems in routing algorithm is the overcrowding was the main issue presented in the routing algorithm. This issue decreased the whole performance of the system. In this study, an attempt was made for finding the superlative routing algorithm which could enhance the overcrowding control scheme amid whole multipath routing protocols.

Mohammad Amin Kheirandish Fard, et.al (2011) stated that Standard congestion control mechanism was not able to identify connection failure losses [13]. These losses occurred because of the nodes mobility and energy shortage in multi-hop Ad-Hoc network (MANET). In addition, consecutive implementations of Back-off algorithm badly extended Retransmission Timeout (RTO) epidemically for novel path. The main aim of this study was to stop dispatcher from sending residual inoperative needless information and the proper management of the quantity of packet rebroadcasting cost. In comparison with Cross-layer approaches which required feedback data from inferior layers, this study operated only in transport layer. This study explored an end-to-end threshold relied algorithm which enhanced congestion control mechanism for addressing connection breakdown loss in MANET. This approach comprised mainly two stages. In the initial stage, threshold relied loss categorization algorithm distinguished losses occurred because of the connection breakdown through calculating queue utilization according to the Relative One-way Trip Time (ROTT). The next stage adjusted RTO for novel path through conducting comparisons amid the ability of novel path and busted path by utilizing data present in transport layer like ROTT and quantity of hops**.**

B.C Sreenivas, et.al (2012) stated that overcrowding control is a very important issue in mobile ad-hoc networks [14]. Clogging or overcrowding or congestion had a very adverse effect on the network throughput, direction-finding and performance of the system. The identification of overcrowding in a Mobile Ad-hoc Network (MANET) was a difficult job. The overcrowding management methods provided by Transmission Control Protocol (TCP) were particularly intended for wired arrangements. Numerous techniques were structured over Transmission Control Protocol (TCP) for identifying and controlling the overcrowding. In this study, framework of Link-Layer congestion control was considered for ad hoc wireless networks. In these networks, bandwidth and holdup were

estimated at every node along with the route. On the basis of the computed values, the receiver estimated the novel window size and transmitted this information to the dispatcher as feedback. The performance of sender was varied properly. The projected method was companionable with the average TCP (Transmission Control Protocol) as well.

III. RESEARCH METHODOLOGY

This research work is related to maintain link failure and quality of service in the network. In this research work, the multi path routing will be improved using the novel parameters in the network. The on demand routing protocols are used for the path establishment from source to destination. The path which has least hop count and maximum sequence number is selected for the path establishment. The multi path is selected from source to destination through the nodes which has maximum power and can balance load for the data transmission. The parameter like buffer size and node connectivity is applied to select nodes for the data transmission from source to destination. To select the multi path, the nodes which has maximum power, buffer size and node connectivity are applied to select new path for the data transmission from source to destination. Following are the various phases of the research methodology:-

1) Deploy the network with the finite number of mobile nodes and define source, destination in the network
2) If (path exists from source to destination)
   2.1 Transmit information over selected path
   Else
   2.2. Source flood route request packets in the network
   2.3. The adjacent nodes of destination will reply back with route request packets
   2.4. Best path is selected on the basis of hop count and sequence number
3) If (link failure occurred)
   3.1. Node send its buffer size and adjacent nodes to source node
   3.2. Node which has maximum buffer size and node connectivity is selected as best node
4) Repeat step 2.1. until whole data get transmitted over the path

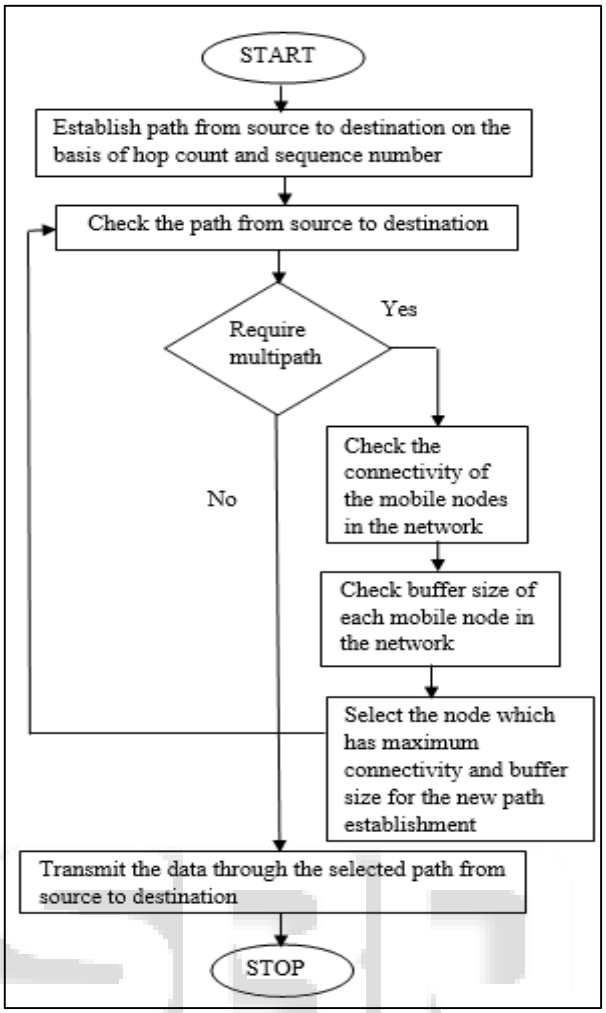

Fig. 1: Proposed Methodology

IV. RESULTS AND DISCUSSION

This research work is related link recovery in mobile ad hoc network. The two parameters are used for link recovery which are buffer size and node connectivity. The performance of the proposed algorithm is tested in terms of certain parameters like PDR, packet loss and delay.

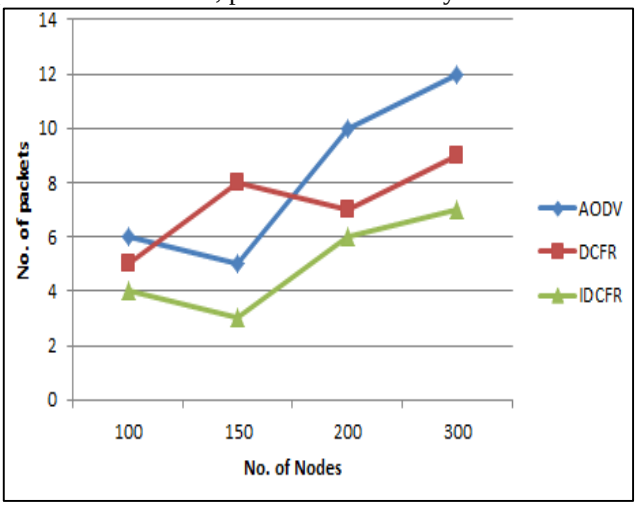

Fig. 2: Packet loss Comparison

As shown in figure 2, the packet loss of the AODV, DCFR and IDCFR protocol is compared for the performance

analysis. The Packet loss of the IDCFR protocol is least as compared to AODV and DCFR protocols

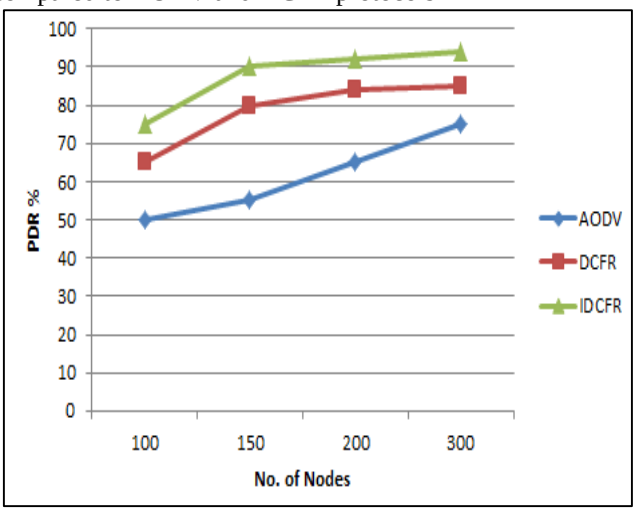

Fig. 3: Packet Delivery ratio

As shown in figure 3, the PDR values of AODV, DCFR and IDCFR protocol is compared and it is analysed that IDCFP protocol performs well as compared to other two protocols. It is analyzed that graphs are drawn versus number of nodes.

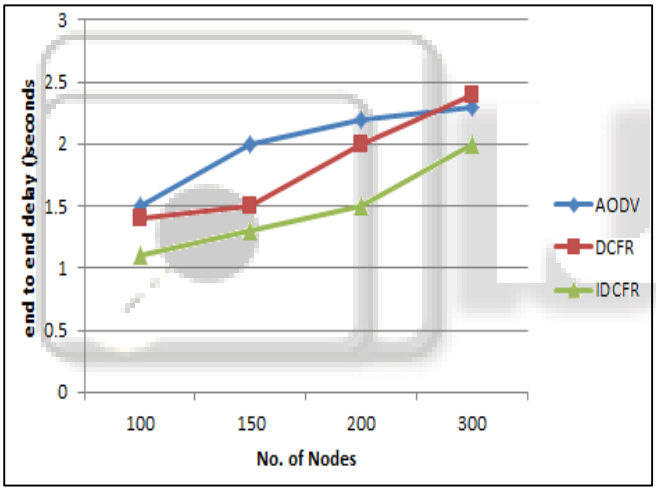

Fig. 4: Delay Comparisons

As shown in figure 4, the delay of improved DCFR Protocol and existing DCFR Protocol is compared and due to route maintaining property of improved DCFR Protocol delay is less as compared to existing DCFR Protocol. The graphs are drawn versus number of nodes.

V. Conclusion

In this work, it is concluded that mobile ad hoc network is decentralized in nature due to which security, routing and quality of service are the major issues which affect network performance. In the previous research work, the link from source to destination is recovered based on the node connectivity. To improve the link quality, the buffer size parameters is added in the network. The proposed algorithm is implemented in network simulator version 2 and results are analyzed in terms of PDR, packetloss and delay. It is analyzed proposed technique give good results are compared to existing technique in terms of all defined parameters

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