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Novel Technique for Link Recovery in Mobile Ad hoc Networks

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Abstract- The mobile ad hoc networks is the decentralized type of network in which mobile nodes can join or leave network when they want. Due to such nature of the network security and quality of service are the major issues. This research work is based on quality of service in the network. The AODV is the efficient routing protocol for the path establishment from source to destination. Due to movement of the mobile nodes, link failure may occur which reduce network performance. In this research work, AODV protocol will be further improved which recover path in case of link failure from source to destination. The proposed protocol is implemented in NS2 and simulation results show high performance of proposed algorithm as compared to existing algorithm

Keywords- AODV, Link failure, Ns2

I. Introduction

MANETs are the set of mobile nodes which are mobile in nature and communicate with other nodes packets moving in the multi-hops in which there is no central controller. Within this network, there are large amount of mobile hosts which use wireless links in order to communicate with each other. The movement of the nodes is random in nature in any direction as this is infrastructure less network in which no central control. Due to this attributes all the nodes in this network act as the router in which packets are transferred by the host [1]. There are several cases in which optimal solutions are provide by the MANET such as in wired or wireless infrastructure in which the issue of damaged and overloaded exists much. It provides the fundamental applications in the field of military operations, emergency and many more. There is change in the topology of MANET dynamically due to the mobility nodes in the random manner. This is the reason of occurring link failure within the MANET's as the topology of the network is not stable. Data loss, delay in transmission is some issues that are caused due to these failures also there are many factors due to which capability of the network is degraded. Therefore, due to the dynamic topology of the network, routing is faced as the major issue in the MANET. There are various routing protocols utilized in MANET and further parts into proactive and reactive routing protocols. There are various issues faced in the MANET during the routing process due to some factors such as nodes within this network are mobile in nature [2]. The distribution of the nodes randomly and the movement of intermediate nodes in the path causes the breakdown of the path. Therefore, it is required to have the effective mobility management during the process of routing. The other major design issue faced in MANETs is the bandwidth constraint. Hence, it is required to design a routing protocol using which the issue of limited bandwidth can be overcome due to which network overhead can be minimized optimally. Another major issues faced in the wireless sensor network are Collision and congestion. The instant movement of the nodes within the network leads to cause data and control packets collisions in the process of transmitting packets in MANET [3]. The issue of hidden terminal and exposed terminal is also faced within it. The packets collision at the end of the receiving node is called as hidden terminal problem. This occurs due to the transmission of the nodes simultaneous towards those which are not in direct transmission range of the sender but lies within the receiver transmission range. In the method of multipath routing there are various types of routes that are generated from source to destination. In case there is link failure in the MANETs, a different route is generated from source to destination in order to continue communication process. If there is disconnections occur in the route, then it stops the transmission of data. Therefore, it minimizes the multicasting within the mobile ad hoc networks. The maintenance of route is done and time consumption can be minimized with the help of other available routing paths. In the process of route discovery, there are some steps that are followed such as searching of the node disjoint, link disjoint or non-disjoint routes [4]. In the condition when link failures occur, the information is send to the source code so that it can take further steps using which data transmission rate can be minimized and any alternate path can be find easily. The issue of the congestion is informed to the source by the

congestion control mechanisms in which transmission control protocol are included. In order to maintain and allocate the network resources, it is required to gather all the users in an effective manner. In this process, all the resources such as bandwidth of relation, queues on the routers or switches are shared. All those packets waiting for their transmission turns are queued. If there are large numbers of packets waiting for one same link in order to free than it causes the overflow of the queue. This overflow caused the packets to be dropped due to which overflow of request prevented within the network. The network is considered as congested in case of frequent dropping of packets within the network [5]. This congestion within the network occur the issue of link failure within the network. Any kinds of failure within the network are informed to the source node such that the packet transmission rate can be slowed down or any route that might not be optimal can be identified. However, the congestion related issue can be informed to the source node using all the congestion control methods since the Transmission Control Protocol is utilized within them. A major concern here is to ensure effective maintenance as well as allocation of the network resources. The bandwidth and queues of routers or switches are used to share the resources in these networks. Within these queues, there are packets arranges which are waiting to be transmitted [6]. The queues overflow and the packets are dropped when a similar link is being demanded by too many numbers of packets. The network gets congested and issue to link failure occurs when packets are dropped commonly in such a way. Due to the absence of infrastructure within Mobile ad hoc networks, the mobile nodes act as routers on their own.

II. Literature Review

Pratik Gite, et.al (2017) proposed the emerging technology of Mobile Ad-hoc Network in this paper that is utilized widely in the wireless connections. Mobility, wireless connectivity and independence are some properties on which this technology is based. Routing protocol is the main factor as it maintains all the routes and their searching procedure. They proposed a new routing protocol in this paper using which priority is given to the available routes on the basis of their path stability [7]. They utilized the link prediction technique for the illustration which is based on the signal strength. On the AODV routing protocol, they implemented the proposed routing concept. The issues of routing overhead, energy consumption, and the throughput for different number of experiments is improved considerably by this method.

Kavitha T, et.al (2017) presented the major issue of the link failure within the mobile ad hoc network occurred because of nodes mobility. They proposed an Instant Route Migration protocol in this paper using which immediately path is constructed in which path distance and hop count are considered. In order to obtain the shortest path immediately, they implemented partial topology aware mechanism [8]. With the help of this method in which packets to the destination can be easily rerouted in case of link failure as at every node cache maintenance is present. As per obtained results, it is concluded that maximum throughput, less end to end delay, instant route migration is provided by the proposed method as compared to existing systems.

ChandaDhakad, et.al (2016) presented the major issue of the routing protocol designing in the mobile ad-hoc network that leads to various major issues are discussed in this paper [9]. This proposed method calculates the every node, link failure factor and also the LFF up to destination node is calculated. The route of the minimum link failure factor is selected after calculating all the values. The minimum steps count between senders and destination is the basis using which the selection of route is done. On the basis of the performed experiments, it is demonstrated that the proposed LFAODV outperforms to SEAODV routing protocol in terms of routing overhead, throughput, packets delivery ratio.

Jyoti Upadhyaya, et.al (2016) presented the infrastructure less and decentralized network in this paper termed as the Mobile Ad-hoc network [10]. They proposed a novel routing metric method using which the signal strength of neighbouring nodes can be calculated easily. It also helps in discovering the route which can cause link breaking and also identified the nodes with high mobility. They proposed an energy based delay in this paper in which on the remaining energy of the nodes this delays is based. Therefore,, it becomes possible to enhance the performance of the network and the network lifetime only by selecting the strong and stable route towards the destination. As per obtained simulation results, it is concluded that proposed SSED-AODV method has better performance as compared to the previously utilized routing protocol.

MOHAMMAD M. KADHUM, et.al (2016) presented there are various significant domains. There are disturbances in the communication due to the change in the topology of the network dynamically as the nodes within the MANETs network are mobile and can move relocate itself. Therefore, to overcome all these issues several routing protocols have been developed so far in which initially in the route discovery backup routes are created [11]. The selected routes have less chance of utilization as the topology changes are not reflected by those routes properly. The active route is restored before the breakage happens is possible by utilizing the available information about the link must be done before becomes exclusive. This procedure enhances the network performance and minimizes the packet loss.

DeepikaVodnalaa, et.al (2016) presented the network in which nodes are independent of each other and can move

freely within the network, this network called as MANET. In this paper, they developed a virtual backbone and also sub parts of it such as tree-based virtual backbone, cluster-based virtual backbone and dominating set-based virtual backbone which is the part of multicast routing [12]. This proposed method has the four phases such as group formation, backbone construction, on-demand route discovery and route maintenance. It also provides the mechanism using which link failures can be recovered quickly by providing separate path in between the failure point and destination.

III. Research Methodology

The Improved Dynamic Connectivity Factor routing Protocol (DCFR) includes the several components in it which are discussed further. The major objective of this proposed protocol is to replace the variables used within the network parameters by utilizing a novel connectivity and buffer size estimation metric. Further, a novel dynamic connectivity factor is utilized in order to drop the extra RREQ packets. Due to this, the routing overhead of the network is minimized. In order to work within the three major stages which are route discovery, route reply as well as route maintenance, the AODV, the NCPR, and the proposed improved DCFR protocol are introduced. The routing table for the destination needs to be checked when there is a need to transmit the data from one node to another within the network. The transmission of data from source node is initiated once the destination is identified. If the destination is not found, a route to the sink node is identified by RREQ [13]. The flooding mechanism however is the only mechanism through which the nodes that have path towards the destination can be identified. In this mechanism, each node that receives RREQ for the first time rebroadcasts RREQ in the network. Further, a Route REPLY message (RREP) is sent back as a reply from the sink node or any node that needs to establish route. However, there is link breakage within the nodes as they move frequently. ARoute ERROR message (RERR) is generated if any such event is identified by any node to the neighbors so that this breakage can be notified .With the minimization of redundant RREQ packets, the flooding issue is addressed by DCFR at initial stage. However, routing overhead still occurs due to the presence of these messages that are relevant to the flooding mechanism. The performance of the DCFR degrades the performance when the link failure occurred in the network. The performance of system is enhanced by recovering the path in the least amount of time. There are numerous disadvantages of various protocols presented in this research. The performance of network is degraded due to the extra routing overhead caused by protocols. In order to resolve all such issues occurring within the route discovery and link recovery process, a novel protocol is proposed here [13]. The various parameters utilized within the experiments are explained further.

IV. Experimental Results

The proposed work has been implemented in NS2 and the results have been evaluated by making comparisons of this approach with existing approach with respect to various parameters such as throughput, delay and overhead.

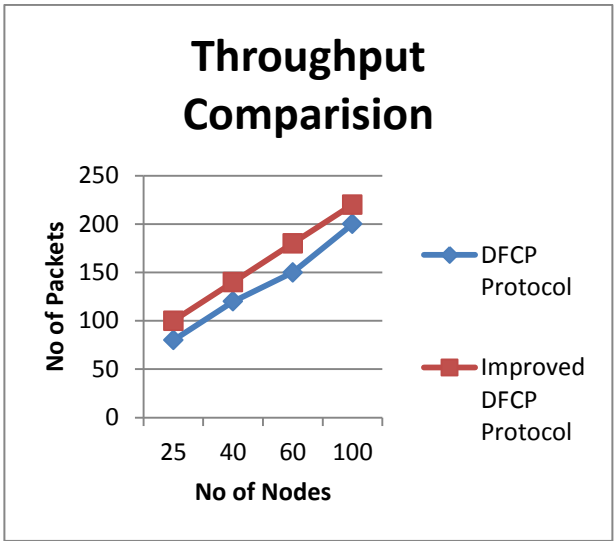

Fig 1: Throughput Comparison

As shown in figure 1, the throughput of the proposed technique and existing DFCP Protocol is compared and the proposed DCFP protocol is responsible to recovery path in case of link failure by considering buffer size parameter. Due to which quality of service get maintained in the network. When quality of service gets maintained in the network, the throughput gets increased as steady rate.

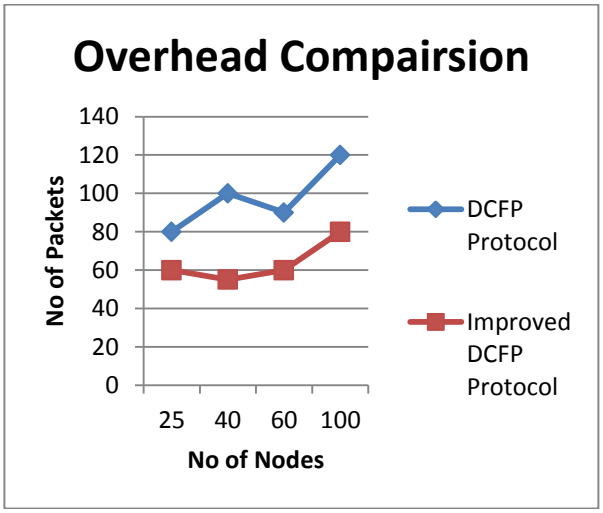

Fig 2: Overhead Comparison

As shown in figure 2, the routing overhead of improved DCFP protocol is compared with existing DCFP protocol. In

the improved DCFP Protocol, the routing overhead is reduced as compared to DCFP Protocol.

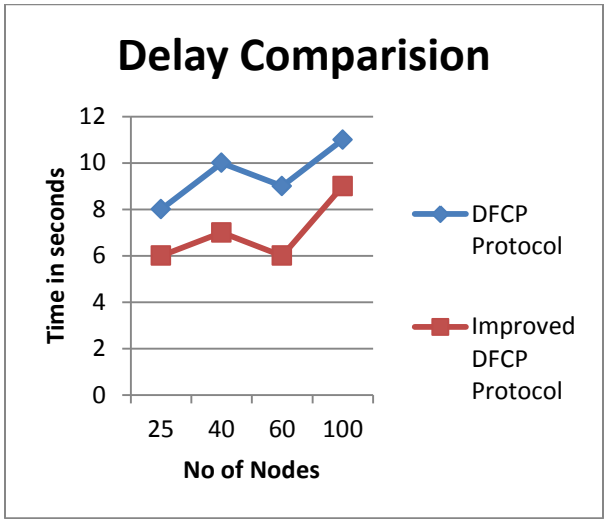

Fig 3: Delay Comparisons

As shown in figure 3, the delay of improved DFCP Protocol and existing DCFP Protocol is compared and due to route maintaining property of improved DFCP Protocol delay is less as compared to existing DFCP Protocol.

V. Conclusion

In this work, it is concluded that wireless ad hoc network is the decentralized type of network in which mobile nodes can leave the network when they want. Due to such type of network, quality of service is the major issue. In this research work, technique is proposed which recover link in case of link failure based on buffer size parameter. The proposed technique is implemented in Ns2 and results shows high performance as compared to existing algorithm

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