Reducing the Effect of Mobility Considering the Two Hop Relay in MANETS

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***Abstract* — The traditional routing mechanism require the available path from the source to destination. Many times, the available paths does not exist, also such path are multi-hop. The high mobility leads to frequent changes in the topology, thus causing the breakage of link. It causes the extra intermediate nodes to transfer the packets, which increase the transmission cost. The multi-hop transmission also increase the end to end delay. The two hop relay provide the better transmission over the network, reducing the end to end delay, packet delivery ratio, and transmission cost, etc. The two hop relay eliminates the condition of path connectivity of source to destination. The proposed algorithm provide the reliable transfer of the packet considering the various parameter.**

***Keywords* — Two-hop-relay, mobility, MANET, Hello message.**

I. INTRODUCTION

MANETs contain wireless nodes, without any infrastructure and centralized operator, where nodes that are not within the direct transmission range of each other, require other intermediate nodes to forward the data [1, 2]. It falls under the general scope of multi-hop wireless networking [2]. As nodes moves freely in network, randomly changing topology, many times there may be the absence of direct or available end to end path between sources to destinations [1]. The traditional route-based routing schemes like DSR, AODV etc., fail to function properly since they require the simultaneous availability of a number of links i.e. available path [1]. The two-hop relay routing are simple and efficient which takes advantage of node mobility and sequences of node contacts to deliver the messages from end to end, has become a promising and attractive routing protocols for MANETs [1,3]. The two hop relay are able to provide a flexible control of both the throughput and packet delay for the challenging MANETs [1]. In two hop relay routing, the source first transmit the packets to the mobiles (relays) it encounters, relay then transmit the packets only if they come in contact with the destination [3]. Under such a routing scheme, a packet reaches its destination either through a direct transmission from the source or by two-hop transmissions via an intermediate relay nodes, which first receives the packet from the source and then forwards it to the destination taking at most two hops to reach its destination [1, 3]. Therefore, each packet travels at most two hops to reach the destination [1]. In recent years through-capacity delay performance in MANETs has been extensively explored [4]. The end to end data transfer, throughput, and packet redundancy are some of the important salient research challenges [2]. The two hop relay can reduce the packet redundancy, end to end delay, and can improve the throughput in MANETs [3, 4]. In MANETs, any node in route can be move away or be turned off, which negatively affects the route maintenance and throughput, may causes delays in data transmissions [5]. It is vitally important for a node in MANET to discover live neighbor nodes through hello messaging [5]. Nodes continuously exchanging hello messages after specific time interval [5].

The data transmission should be efficient throughout the network. The cost of data transfer should be less. The multiple hop leads to increase the cost of transfer the data over multiple hops present between the source node and destination node. Reducing the number of hops between the source node and destination node is beneficial to reduce the transmission cost. So the data should be transmitted directly or using maximum two hop to reduce the transmission cost.

In this paper, a two hop relay algorithm is proposed. The traditional routing needs to have the available path from source to destination. Sometimes the simultaneous links between the nodes does not present. So that the traditional routing fails to service properly. If the destination node is present in the transmission range of source node, then the data is directly sent to the destination node. It use a single hop count and cost is very low, i.e. one hop. But if the destination is not directly connected to the source node, then the source node send the data to the randomly selected neighboring node. If the destination node is directly connected to the selected node then the data packet is sent to the destination, carrying data on two hop. If the destination node does not present in the transmission range of the selected node, that selected node waits till the destination node comes in contact with it. The hello message is periodically exchange between the neighboring nodes, which discovers the live neighboring nodes in the maximum transmission range of the particular node.

II. BACKGROUND

A two hop relay algorithm is one of the prominent approach to control the packet redundancy in [1], where each transmitter is able to conduct specific rounds of probing for the identification of a possible receiver and delivering the packets to predefined i.e. specific number of distinct relays. It covers almost available two-hop routing protocol as special case for single prob. Also a general framework is developed to resolve the complex packet delivery process. The combined approach for routing considering the proactive and source routing as proactive source routing PSR described in [2]. Each node create a breadth first search spanning tree of the connected nodes in the network considering itself as a root. The tree is used as the data information which can be used to exchange between the neighboring nodes for updating the topology. It allows a node to have full path information to all other nodes in

the network. The conventional two hop relay is extended to a group based two hop relay considering packet redundancy to improve the flexibility in packet delivery delay in [3]. Also, a general two hop relay algorithm is proposed. In this, the packet redundancy limit and group size is specified. Each packet is delivered at most f distinct relay nodes and if a fresh packet is encountered, then it is accepted by its destination. Throughput can be decreased by using the two hop, is achieved in [4], improving the packet delivery ratio, and end to end delay. The next hop is the neighbor node present in the maximum transmission range. It is necessary to find the live neighbor in the transmission range. It can be carried out by using hello message as shown in [5] to find the live node for sending the data.

III. PREVIOUS WORK DONE

Jiajia et. al. [1] proposed a general probing based two-hop relay algorithm, which consider the limited packet redundancy. Each transmitter is allowed to conduct up to a specific rounds of probing to identify a possible receiver. The packet can be delivered to the specific nodes. Further, a general theoretical framework is developed to characterize the complicated packet delivery process, in which the finite-state absorbing Markov chain technique. Zehua et. al. [2] proposed PSR (proactive source routing) deal with network topology in better way, where each node maintains a breadth first search spanning tree of the network rooted at itself, is the data information which is prior to exchange between the neighboring nodes for updating the network topology information. In this way, PSR allows a node to have full path information to all other nodes in the network. The PSR allows to support both source routing and conventional IP forwarding. The overhead in PSR is only a fraction of the overhead of the baseline protocol, and PSR yield better data transportation performance than the other baseline protocols. Jiajia et. al. [3] extended the conventional two-hop relay to a group-based two-hop relay with packet redundancy to enable the packet delivery delay to be flexibly controlled in a large region, and also proposed a general two hop relay algorithm, in such an algorithm with packet redundancy limit and group size (2HR-(f,g) or short), each packet is delivered to at most f distinct relay nodes and can be accepted by its destination if it is a fresh packet to the destination and also it is among packets of the group the destination is currently requesting. The theoretical framework is efficient in delay analysis. And the algorithm actually enables both the mean value and variance of packet delivery delay to be flexibly controlled in a large region. Jiajia et. al. [4] studies the exact per node throughput capacity of a MANET, and developed a general theoretical framework to fully depict the complicated packet delivery process in the challenging MANET. With the help of the framework, exact per node throughput capacity can derive for a fixed setting of both υ and f. Based on the new throughput result, the optimal throughput capacity for any f but a fixed υ is explored and also determined the corresponding optimum setting of 'f' to achieve it. Seon et. al. [5] proposed an adaptive Hello messaging scheme for neighbor discovery by effectively suppressing unnecessary Hello messages. The proposed scheme dynamically adjusts Hello intervals, and does not increase the risk that a sender will transmit a packet through a broken link that has not been detected by Hello messaging. This is called the probability of failure of detection of an unavailable link (PFD). To estimate this risk, an average event interval is exploited, that is, an average time gap between two consecutive events (i.e., sending or receiving a data packet) on a node.

IV. EXISTING METHODOLOGY

A) Capacity and Delay of Probing-Based Two-Hop Relay

A more general probing-based two-hop relay algorithm [1] with limited packet redundancy is proposed to resolve such limitation for a more efficient utilization of limited wireless bandwidth. In such an algorithm, the specified probing round limit and packet redundancy limit are considered. Each transmitter node is allowed to conduct up to specified rounds of probing for identifying a possible receiver node and each packet can be delivered to at most the specified distinct relays. Further a general theoretical framework is established to help the recognition of the different setting of probing and the packet redundancy. It can be benefited from multiple probing in terms of the, throughput of each node's capacity and the expected end-to-end packet delay.

B) Generalized Two-Hop Relay for Flexible Delay Control

The conventional two-hop relay algorithm [3] is improved and a general group-based two-hop relay algorithm with packet redundancy is proposed. In such an algorithm with packet redundancy limit and group size (2HR-(f,g) or short), where f is the number of distinct nodes and g is group size. Each packet is delivered to at most f distinct relay nodes and can be accepted by its destination if it is a fresh packet to the destination and also it is among packets of the group the destination is currently requesting. A Markov chain-based theoretical framework is further developed to analyze how the mean value and variance of packet delivery delay vary with the parameters.

V. ANALYSIS AND DISCUSSION

The traditional routing i.e. AODV and DSR etc. needs available path from source to destination to transmit the packet. But there are very few possibility of the direct path availability. So that, the two hop relay scheme is one of the best approach. The two hop relay does not need the direct connection form source to destination. It can be carried out over the maximum two hop in transmitting the data. The capacity and delay of probing based two hop relay algorithm consist of the packet redundancy limit i.e. the number of node to which the data can be resend. In generalized two hop relay for flexible delay control, the improved version of the two hop relay is proposed. In both, the conditions regarding the packet redundancy limit cause the extra overhead by delivering the data to nodes. This can be control not to resend the data to the network for unnecessary requirement.

The data is transmit over the network often use the intermediate node producing the hop count in traditional routing. It increase the transmission cost and the extra time to reach the packet to the destination. If the hop can be reduced to improve the performance respect to packet delivery ratio and end to end delay, then it can be the big achievement over data transmission. The end to end delay is reduced by transmit data

over two hop relay, and providing the better mechanism for control of transmission. Thus the two hop relay improve the performance over the network.

VI. PROPOSED METHODOLOGY

It is very important to discover the live neighbor node. So it can be carried out with the help of hello message sending periodically to the neighboring nodes. The periodical time of sending the hello message can be calculated by using current moving speed of the node. The hello message consist of msgid, timestamp, and node id (NID). As the node has to send the data at particular time, it waits for next recent hello messages from the neighbors. As the hello messages received, the source node checks whether the destination node is present. If so, then the message is directly sent to the destination node. If the destination node is not present, then the source node send the hello message consisting msgid, timestamp, data, SID, DID, and f=1 to the selected node. 'f=1' shows that the selected node must send the data to the destination node only and not to other node, preserving the condition of data transmission over two hops.

The proposed algorithm is as follows:

1) Calculate the current moving speed
2) Calculate the time interval based on moving speed
3) Send the hello msg to neighbor
4) If NID==DID
5) Send Packet to destination
6) Else send packet to randomly selected neighbor with f=1
7) If f==1 & NID==DID
8) Send message to destination
9) Else wait for next hello message
10) Goto step 7

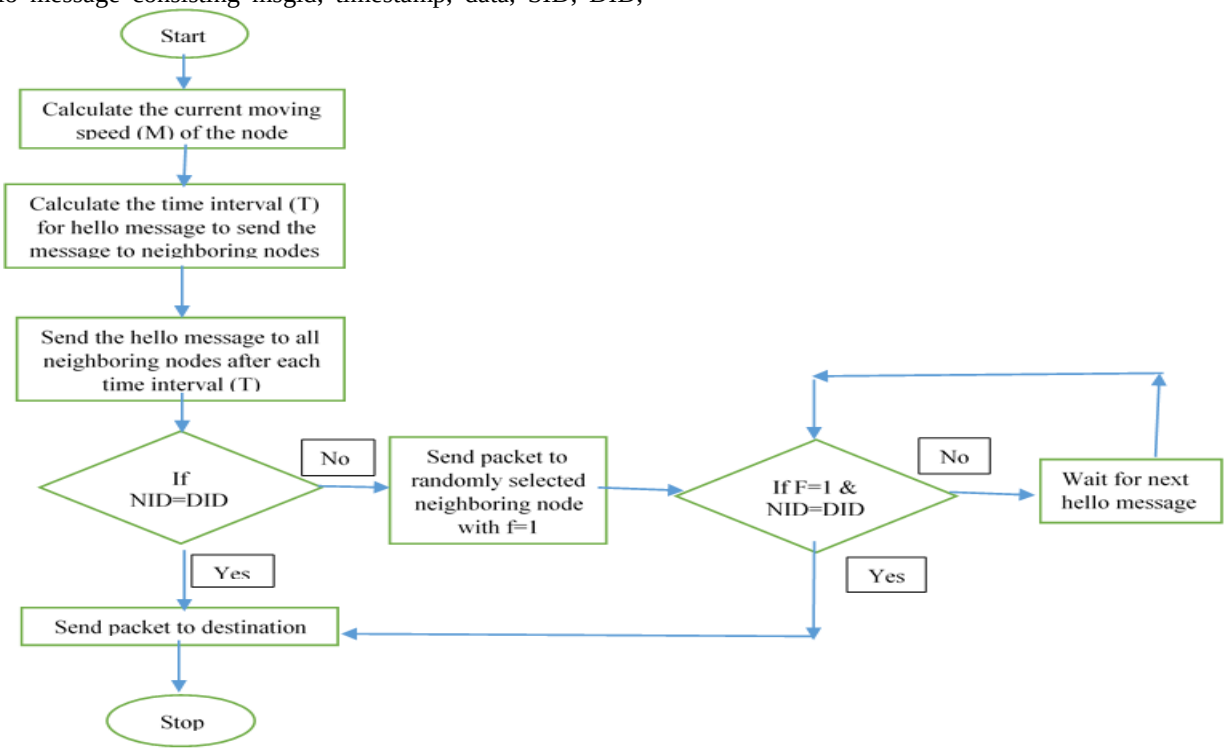

Fig 1: Flowchart of proposed algorithm

VII. POSSIBLE OUTCOME AND RESULTS

The two hop relay is very efficient approach to packet delivery and time to reach the destination. The hello message is used to find the live node in the maximum transmission range of the particular node. Then, it check for availability of the destination node whether it is in direct transmission of the source node if the destination is present then the packet is directly send to the destination causing one hop count. This is the efficient transmission where the transmission cost is the one hop count. If the destination is not in the direct transmission then the node is randomly selected as the next relay node. The packet is sent to that relay node with the DID and Flag f=1, which shows that the packet has to be sent to the source node only then the relay node find whether the destination is present in the maximum transmission range with the help of the hello message, if so, then the packet is sent to the destination. If the destination node is not present, then the relay node waits for next hello message, and check for the destination. As the high mobility cause the frequently changing the topology, the nodes can move away from the maximum range of the particular node. So that the time interval of the hello message can be calculated over the moving speed of the node and the probability of the node leaving the transmission range.

The two hop usage gives the minimized cost of the transmission i.e. at-most 2 hops. It reduced the end to end delay, and also the packet redundancy by delivering the packet to the destination. The two hop deals with the least usage of network increasing the throughput over the link considering the possible bandwidth usage of particular transmission.

CONCLUSION

The two hop relay is prominent approach, which provide better transmission of packet over the network. The proposed algorithm reduced the extra overhead considering the reduced hop count in transmission of packet through the

at most two hops. Also the hello message guarantee to find the live node in the particular transmission range, providing the next hop to the source node. The packet is sent to the destination directly or through one hop which reduced the link usage and does not let busy the link for transmitting the packet over unnecessary packet transmission. It improves the throughput, decrease the packet drop, and so increase the packet delivery ratio.

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