A Technique to Find Optimum Path for Reducing Data Transfer Delay in Mobile Ad-hoc Networks

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Abstract-- The mobile devices are providing substantial services in the field of network. Mobile phones are used to communicate, browse, transfer of files, etc. Mobile Ad-Hoc Networks (MANETs) is a technology of wireless devices like Bluetooth. It is an infrastructure-less network, which is dynamic network containing a more number of individual wireless mobile nodes(devices) that communicate with one another without any aid of centralized server or base station. Due to dynamic topology, MANET faces many issues associated with mobile nodes such as battery power, delay etc. The main aim of this paper is to reduce data transfer delay by finding optimum path. Ultimately, the outcomes of the proposed work increase the performance of MANET.

Keywords—MANET, Data transfer, Delay, Wireless mobile nodes and Optimum path

I. INTRODUCTION

In the present generation of wireless communication systems, there would be a need for the fast communication of each mobile user. MANET is an infrastructure less network it has no base station. It sends the data packets through the neighbor nodes to the destination node. Mobile nodes can move dynamically and freely self-organized network topologies. MANET is used to solve challenging real world issues of military communication like automatic battlefield equipment, sensor networks for sensing the remote weathers and also for other earth activities, in case of emergency services such as earthquakes or any disaster recovery. MANET also has educational applications like setting up a virtual class or conference rooms to share their resources among the users. The proposed technique is used to discover the network topology for MANET to communicate with one another for sending the data in less time interval. Mobile Ad-Hoc Network need efficient algorithms to determine network topology, link scheduling and routing. It finds the minimum neighborhood node path among the multiple paths from the source to destination. It calculates the node's property and stores the information in to the path table.

This paper is organized as follows: Section 2 presents the related work. Section 3 explains the proposed technique, computes the minimum neighborhood node that reduces the data transfer delay from source to destination. Section 4 highlights results and discussions. Section 5 is conclusion. Finally, references are cited.

II. RELATED WORKS

Many researches are being focused on MANET to provide data service, when there is no infrastructure. Shalini et al., [1] intended to discover neighbor node distance method and key distribution methods to evaluate the performance against masquerading attack to improve the network performance and secure data transfer on the network. Kure et al., [2] developed routing protocol in MANET to increase the packet delivery ratio and to reduce end to end delay. They had set timer to calculate rebroadcast delay.

Roopali Garg et al., [3] concentrated in the Particle Swarm Optimization (PSO) to calculate the fit value to optimize the number of rebroadcasts should be limited. In order to control routing overhead neighbor knowledge and rebroadcast probability method used for rebroadcasting a request. Surya et al., [4] implemented a technique called the Neighbor Position Verification (NPV) routing protocol designed to protect the network from corrupted nodes by verifying the position of neighbor nodes to improve security and efficiency performance in MANET routing.

Khaleel Husain et al., [5] researched in PSO based neighbor monitoring scheme is used to detect and defense from the various attacks. It checks the node status periodically to find out the node is valid or malicious. This ultimately improves the network performance. Vijay U. Patil et al., [6] explored Neighbor coverage based probabilistic rebroadcast protocol for reducing routing overhead in

MANETs. It reduces the number of retransmissions and improves the routing performance. Priyanka Sheela et al., [7] proposed Good Node Detection Algorithm (GNDA) to obtain more accurate extra coverage ratio by sensing neighbor node coverage. It selects the trust node to transmit the data by detecting selfish nodes. This technique decreases the number of retransmissions and improves the network performance. Shaik Arif Basha et al., [8] analyzed routing process in the network becomes more complicated issue due to increase in mobile nodes. Each and every mobile node accesses the services by knowing the location based service. The designed protocol updates the position of the nodes in dynamic nature. It adapts the routing position changes when a node movement is frequent.

Nandhini et al., [9] discovered an efficient route via suitable path, the neighbor node information and stable path values are considered to reduce the latency and overhead of routing. The proposed protocol mitigates the network collision as the result it increases the packet delivery ratio and reduces the end to end delay. Harpreet Kaur et al., [10] proved that routing overhead goes peak level because neighbor discovery messages in the MANET. To reduce the unnecessary hello messages they designed random waypoint model and investigated the relationship between the hello interval and event intervals.

Kavitha et al., [11] developed Optimal Link Managed on Demand routing protocol to increase the Quality of Service (QoS) in MANET. It maintains the available paths and connects to another alternative path if there is no transmission, which reduces the latency by reinitiating route discovery. Sivakumar et al., [12] proposed efficient technique it eliminates the repeat HELLO messages in order to reduce the unwanted battery power and delay. The nodes have scanned frequently to check whether the routing path got broken.

Thenmozhi et al., [13] in this paper novel scheme is explained to find out the shortest path between even in the presence of large number of nodes. The multipath route discovery protocol is used for the minimization of the route selection among paths. Suganya Devi et al., [14] used directional antenna algorithm to discover the neighbors and assists to reduce the number of time slots to discover all the neighbors in the network and provide security mechanism to improve the cooperation among the neighbor nodes. Calduwel Newton et al., [15] proposed Shortest Path Genetic Algorithm (SPGA) is proposed to perform efficient routing and the detection of Denial of Service (DoS) through immune mechanism

III. A PROPOSED TECHNIQUE

The proposed technique computes the minimum neighborhood node path that reduces the data transfer delay from source to destination. The proposed technique has the following steps.

Step 1: Initialize the path to transfer the data Step 2: Count the neighbor nodes for each node

Step 3: Check the total number of neighbor nodes in all the paths and select the path which has minimum number of neighbor nodes

Step 4: If there are more than one path that have equal number of neighbor nodes then select the path that has minimum delay

Step 5: If the delay is the same for more than one alternative path then select the alternative path which is calculated first Step 6: Continue the data transfer

Step 7: Repeat the steps 2-7 until the data transfer is accomplished

Certainly, it continues data transfer. The steps 3-7 are repeated again and again until the data transfer is accomplished. Probably, forwarding data packets via optimum path saves energy, time and speed of the data transfer.

IV. RESULTS AND DISCUSSIONS

The proposed technique is used to select minimum neighborhood node path among the multiple paths. It is carried out by considering the network topology given in Fig 1. There are 7 nodes have been considered in the network topology for MANET. They are, A, B, C, D, F, G and H. The number on the edges depicts the delay in seconds. Here, A denotes source and H denotes destination, other nodes are intermediate nodes.

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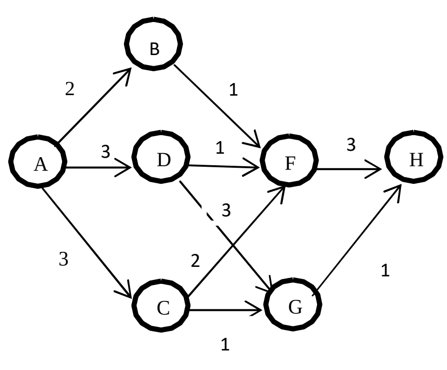

Figure 1: Network Scenario 1

Scenario 1:

Consider the above network topology in which A has three neighbors (B, C and D), B has two neighbors (A and F), C has three neighbors (A, F and G), D has two neighbors (A and F), F has four neighbors (D, B, C and H), G has two neighbors (C and H) and H also contains two neighbors (G and F). For example the path A→B→F→H has totally 11 neighbors (i.e.3+2+4+2=11) it is given in Table 1.Similarly, all the neighboring nodes of paths are calculated. The initial path is identified based on any existing algorithm (i.e. A→B→F→H). If any node leaves from the initially selected path, the proposed technique identifies the alternative path from Table 2 by considering minimum number of neighborhood nodes of paths.

TABLE 1: NODES AND THEIR NEIGHBORS

Nodes	Neighboring Nodes	No. of Neighboring Nodes
A	B C D	3
B	A F	2
C	A F G	3
D	A F	2
F	D B C H	4
G	C H	2
H	G F	2

Here, the alternative path, A→C→G→H is selected since it has minimum number of neighbors, 10 (i.e. 3+3+2+2=10). The proposed technique gives first preference to minimum number of neighbors. If two paths have same number of neighbor, then it considers delay parameter (i.e. explained in Table 4).

TABLE 2: PATH(S) WITH DELAY

Path(s) Number	Routing Path	Total No. of Neighbor Nodes	Delay (in Secs.)
P1	A→B→F→H	11	6
P2	A→C→G→H	10	5
P3	A→C→F→H	12	8
P4	A→D→F→H	11	6

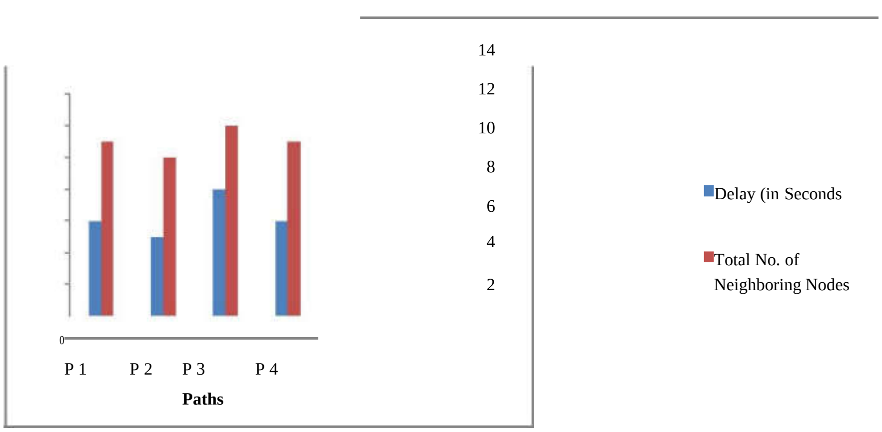

Figure 2: Nodes and their Neighbors with Delay (Scenario 1)

Figure 2 shows the various numbers of nodes and their neighbors with delay parameter. The proposed technique selects the Path 2 since, it has minimum of neighboring nodes.

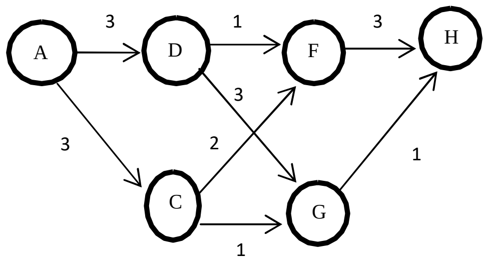

Figure 3: Network Scenario 2

Scenario 2:

In this scenario, B leaves from the network as shown in Fig 3.Each and every nodes are calculated their neighbors and stored in Table 3. The proposed technique identifies the best optimum path from Table 4. It identifies the alternative paths based on number of neighbor node calculation. Here, there are four alternative paths are available, A→D→F→H, A→C→G→H, A→C→F→H and A→D→G→H as they have same number of neighboring nodes. In this case when neighboring nodes are equal it considers delay parameter to select best optimum path. If the value of neighboring nodes and delay are equal, then the best optimum path is selected from the Table 4 which is calculated first.

TABLE 3: NODES AND THEIR NEIGHBORS

Nodes	Neighboring Nodes	No. of Neighboring Nodes
A	C D	3
C	A F G	3
D	A F G	3
F	C D H	3
G	C D H	3
H	G F	2

Here, the alternative path, A→D→G→H is selected as it has minimum number of neighbors, 11(i.e. 3+3+2+3=11) and minimum delay when compared with other paths.

TABLE 4: PATH(S) WITH DELAY

Path(s) Number	Routing Path	Total No. of Neighbor Nodes	Delay (in Secs.)
P1	A→D→F→H	11	6
P2	A→D→G→H	11	5
P3	A→C→F→H	11	8
P4	A→C→G→H	11	5

Figure 4 shows the various numbers of nodes and their neighbors. The proposed technique considers the Path 2 as it has equal number of neighboring nodes and delay.

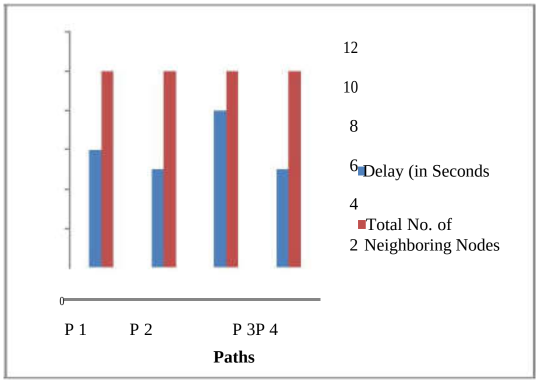

Figure 4: Nodes and their Neighbors with Delay (Scenario 2)

Scenario 3:

If the neighbor nodes of path and delay are equal, then the best optimum path is selected from the alternative table which is calculated first as shown in Table 4.

V. CONCLUSION

In MANET, some routing algorithms are used to transfer the data via multiple paths to reduce end-to-end delay between source and destination. Continuous data transfer is not possible since all the nodes are changing dynamically. The proposed technique, considers two important parameters such as number of neighbor node calculation and delay. It selects the best optimum path from multiple paths. It takes attempt to transfer the data quickly. Ultimately, it increases the speed of the data transfer in MANET as the path selected by the proposed technique has minimum neighbors. Although proposed technique has many advantages, it also has weakness like maintenance of tables and routing overhead.

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