International Journal of Computational Intelligence Research
ISSN 0973-1873 Volume 13, Number 7 (2017), pp. 1789-1797

http://www.ripublication.com

Monitoring "Early Congestion Detection Technique" Using Mobile Ad-hoc Networks

Dr. Anjali B Raut
Head Of Department of Computer Science & Engineering. HVPM's COET, Amravati University (Maharashtra), India.

Mr.Jaicky R. Sancheti
Department of Computer Science & Engineering. HVPM's COET, Amravati University (Maharashtra), India.

Abstract

Congestion in mobile ad hoc networks leads to transmission delays and packet losses and causes wastage of time and energy on recovery. In the current designs, routing is not congestion adaptive. Routing may let a congestion happen which is detected by congestion control, but dealing with congestion in this reactive manner results in longer delay and unnecessary packet loss and requires significant overhead if a new route is needed. This problem becomes more visible especially in large-scale transmission of heavy traffic such as multimedia data, where congestion is more probable and the negative impact of packet loss on the service quality is of more significance. Routing should not only be aware of, but also be adaptive to, network congestion. Routing protocols which are adaptive to the congestion status of a mobile ad hoc network can greatly improve the network performance. Many protocols which are congestion aware and congestion adaptive have been proposed. In this paper, we present a survey of congestion adaptive routing protocols for mobile ad hoc networks. Ad hoc networks consist of independent self-structured nodes. Nodes utilize a wireless medium for exchange their message or data, as a result two nodes can converse in a straight one to one connection if and only if they are within every other's transmit range.

Keywords: Ad hoc networks, routing protocols, mobile computing, congestion adaptivity.

I. INTRODUCTION

A Mobile Ad-hoc Network is a collection of independent mobile nodes that can communicate to each other via radio waves. The mobile nodes that are in radio range of each other can directly communicate, whereas others needs the help of intermediate nodes to route their packets. Each of the node has a wireless interface to communicate with each other. These networks are fully distributed, and can work at any place without the help of any fixed infrastructure as access points or base stations. Figure 1 shows a simple ad-hoc network with 3 nodes. Node 1 and node 3 are not within range of each other, however the node 2 can be used to forward packets between node 1and node 2. The node 2 will act as a router and these three nodes together form an ad-hoc network [1].

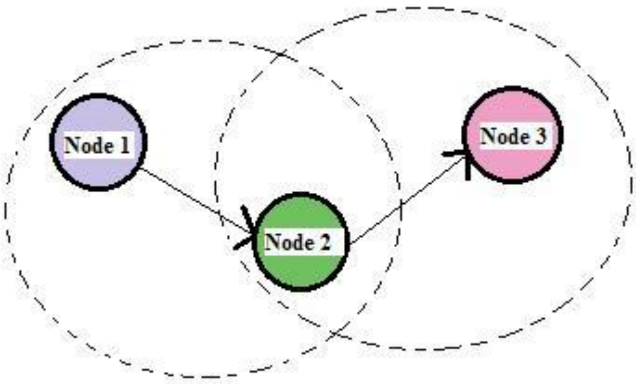


Figure1.1: Example of mobile ad-hoc network

Mobile ad-hoc networks can turn the dream of getting connected "anywhere and at any time" into reality. Typical application examples include a disaster recovery or a military operation. Not bound to specific situations, these networks may equally show better performance in other places. As an example, we can imagine a group of peoples with laptops, in a business meeting at a place where no network services is present. They can easily network their machines by forming an ad-hoc network. This is one of the many examples where these networks may possibly be used. [2]

Congestion leads to transmission delay, packet loss, wastage of time and energy during congestion recovery. Routing protocol which is adaptive to mobile ad-hoc networks congestion status can greatly improve network performance. Present work proposes a congestion-adaptive routing protocol for mobile ad -hoc networks (CRP), whereas in the reported designs, routing is not congestion-adaptive. Routing allows congestion to happen which is detected by congestion control. When new route is required, dealing with congestion in this reactive manner results in longer delay, unnecessary packet loss and requires significant overhead. This problem becomes more significant especially in large-scale transmission of heavy traffic such as multimedia data, where congestion is more probable and the negative impact of packet loss on the service quality is of more significant. This work will propose a protocol called CRP which is adaptive to the network congestion [1].

A homogeneous ad-hoc network suffers from poor scalability because the network performance is degraded quickly as the number of nodes increases. [6]

The following are the general causes of congestion in MANET:

1. The throughput of all nodes in a particular area gets reduced because many nodes within range of one another attempt to transmit simultaneously resulting in losses.
2. The queue or buffer used to hold packets to be transmitted may overflow within a particular node. This is also the cause of losses.

Therefore, for overcoming these issues with the help of simulation. Following are the propose methods.

1. To find the primary path from source to destination.
2. To find the shortest path from source to destination.
3. To find out the congestion which might occur on a particular node with the help of 'Early Congestion Detection Technique'.
4. To bypass the data, if congestion occurs on a node before reaching on the node having congestion or on the node on which the congestion may occur, so that time loss to reach destination will be decreased [7].

II. RELATED WORK

Congestion occurs in ad-hoc networks with limited resources. In such a network, packet transmission frequently suffers from collision, interference, and fading, due to shared radio and dynamic topology. Transmission errors burden the network load. Recently, there is an increasing demand on supporting multimedia communications in ad hoc networks [9].

Types of Wireless Networks

One of the unique features of wireless networks in comparison with the wired network is that data is transmitted from one point to another through wireless links i.e. there is no need of wired link between the two nodes for transmission. They just need to be in the transmission range of each other. Wireless networks or divided into two categories. Infrastructure wireless network and infrastructure less or ad hoc wireless network. [4]

I) Infrastructure Networks

Infrastructure network have fixed network topology. Wireless nodes connect through the fixed point known as base station or access point. The base station, or access point, is one of the important elements in such types of networks. All of the wireless connections must pass from the base station. Whenever a node is in the range of several base stations then it connect to any one of them on the bases of some criteria [10].

II) INFRASTRUCTURE-LESS NETWORK

Infrastructure less networks are complex distributed systems consist of wireless links between the nodes and each node also works as a router to forwards the data on behalf of other nodes. The nodes are free to join or left the network without any restriction. Thus the networks have no permanent infrastructure. In ad-hoc networks the nodes can be stationary or mobile. Therefore one can say that ad-hoc networks basically have two forms, one is static ad-hoc networks (SANET) and the other one is called mobile ad-hoc networks (MANET). From the introduction of new technologies such as IEEE 802.11 the commercial implementation of ad-hoc network becomes possible . One of the good features of such networks is the flexibility and can be deployed very easily. Thus it is suitable for the emergency situation. But on the other side it is also very difficult to handle the operation of ad-hoc networks. Each node is responsible to handle its operation independently. Topology changes are very frequent and thus there will be need of an efficient routing protocol, whose construction is a complex task. TCP performances are also very poor in mobile ad-hoc network [1].

III. PROPOSED ALGORITHM

The shortest path can be find on the basis of distance vector protocol. The distance vector protocol uses Bellmon-Ford algorithm. Bellmon-Ford routing algorithm is distance vector based and iterates on the number of hops a source node is from a destination node. It computes shortest paths from a single source vertex to all of the other vertices in a weighted digraph. It is slower than Dijkstra's algorithm for the same problem, but more versatile, as it is capable of handling graphs in which some of the edge weights are negative numbers. Negative edge weights are found in various applications of graphs, hence the usefulness of this algorithm. If a graph contains a "negative cycle" (i.e. a cycle whose edges sum to a negative value) that is reachable from the source, then there is no cheapest path: any path can be made cheaper by one more walk around the negative cycle. In such a case, the Bellman–Ford algorithm can detect negative cycles and report their existence. Like Dijkstra's Algorithm, Bellman–

Ford is based on the principle of relaxation, in which an approximation to the correct distance is gradually replaced by more accurate values until eventually reaching the optimum solution.[9]

1 initialize graph

Bellman-ford (vertices V, edges E, source vertex srv)

For each **v** in **V**

{

If **v** = **srv**than d[v] =0

Else d[v] = infinite

Cost[v] = null

}

2. Relaxation of edges

For i form 1 to IVI-1

{

For each [u,v] with **w** in **E**

{

If d[u]+w<d[v]

{

If d[v]=d[u]+w

Cost[v] =u

}

}

}

3. Checking negative cycle

For each e(u ,v) with weight **w**in**E**

{

If d[u]+w,d[v]

{

Print "graph has negative cycle"

}

}

V. Simulation Results

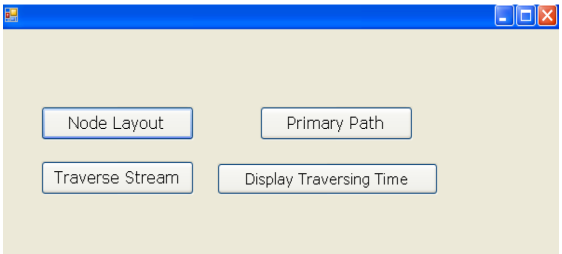


Figure:-Control panel of system

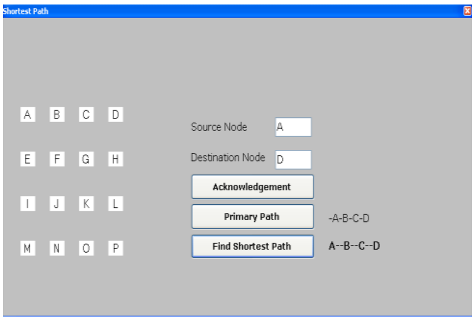
This is the control panel of our system

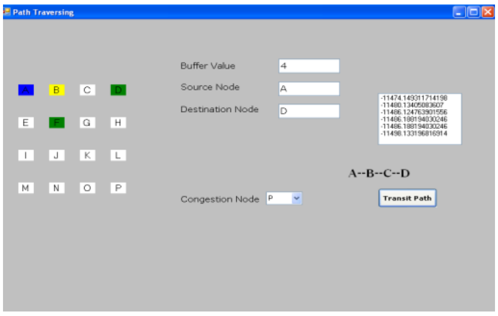
Node Layout:- This will decide the node layout of our system.

Primary Path:-This will decide the primary path of the system.

Traverse Stream:- This will decide the further implementation of the system.

Display Traversing Time:- This will display the total time taken by congested as well as bypass path.



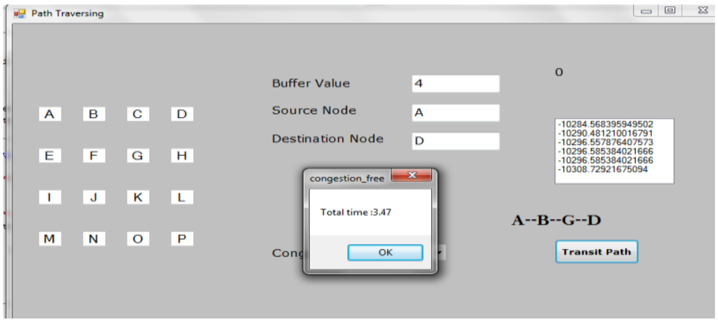


Screenshot1 : Traverse path system Screenshot2 : Transmission of bypass path

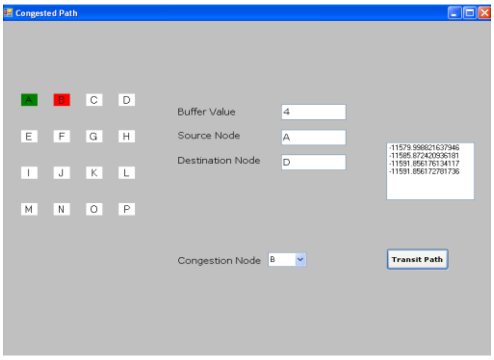
In (Screenshot1) shows the source and destination nodes. Acknowledgement is for the nodes are the valid nodes or not. It will find out then the Primary path & Shortest path respectively.

In (Screenshot2) is the traversing path screen which will pass the message step by step from source to destination.

When the particular node seems to be congested in future it will blink yellow & the system will find bypass route to eliminate the congestion ahead. It will also count the timing of transmission of each message.



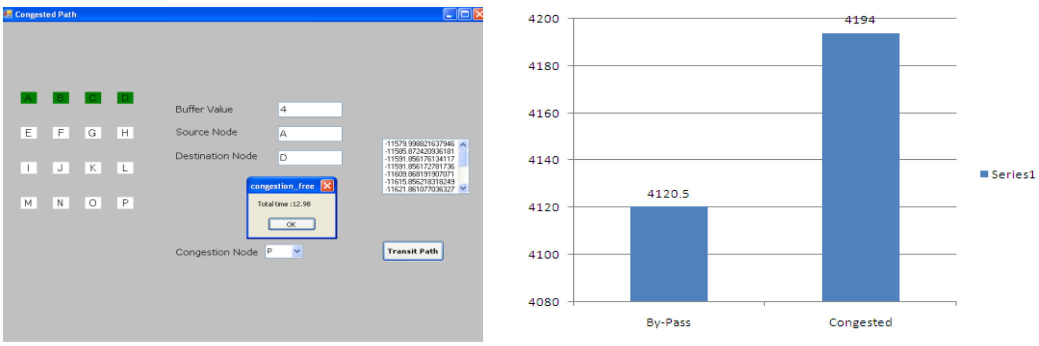
Screenshot3 : Total time calculation for bypass path



Screenshot4 : Transmission of congested path

In (Screenshot3) display the total time required to complete the transmission by using bypass path.

In (Screenshot4) is the congested path screen, in which the node which is prone to be congested is getting totally congested by showing red blink. It also count the time of each transmission.



Screenshot5 : Time calculation for congested path

In (Screenshot5)After congestion gets cleared normal transmission takes place from source to destination.

Last screenshot shows the graph between the time taken by congested and bypass path. The time taken by bypass path for transmission is always less as compared to the congested path. This is the final result of our simulation.

VI. CONCLUSION AND FUTURE WORK

This work initiates a congestion-adaptive routing protocol for MANETs. A key in CRP design is the bypass concept. A shortest path also provides exact transmission route with the help of distance vector protocol. A bypass is a sub-path connecting a node and the next non-congested node. Part of the incoming traffic will be sent on the bypass, making the traffic less, that is coming to the potentially congested node. The bypass path which is based on ECDT works effectively. The result of the simulation shows that whenever congestion occurs the transmission time required by congested recovery is greater than that of bypass path. Bypass path in CRP can effectively minimize the congestion as a result.

By implementing this protocol the overall throughput of the system can be enhanced. The system can work more efficiently if error correction and error recovery techniques would be developed. As most of the networks would be ad-hoc in future this protocol gives them efficient solution for routing. By developing the protocols that can trace the exact behavior of changing topology more efficient routing can be possible.

REFERENCES

[1] Jaicky R. Sancheti, Dr. A B Raut "Implementation of Congestion Awareness and Adaptivity in Mobile Ad Hoc Networks" "International Journal on Recent and Innovation Trends in Computing and Communication" (IJRITCC) volume 5, Issue 4, April 2017

[2] Md. Mahbubul Alam and Tanmoon Taz Shetu, "Congestion control in Mobile Ad-Hoc Networks" Thesis report Submitted to sadia hamid kazi, computer science and engineering Department of BRAC university 2011

[3] Yuvaraju B N, Dr. Niranjan N Chiplunkar, "Scenario Based Performance Analysis of Variants of TCP," International Journal of Computer Applications (0975 – 8887), Volume 4– No.9, August 2010.

[4] N Vetrivelan, Dr. A V Reddy "Performance Analysis of Three Routing Protocols for Varying MANET," Size‖ Proceedings of the International MultiConference of Engineers and Computer Scientists 2008 Vol II IMECS

2008, 19-21 March, 2008, Hong Kong.

[5] Chen, X., H. M. Jones, A .D .S. Jayalath, "Congestion-Aware Routing Protocol for Mobile Ad Hoc Networks," Vehicular Technology Conference 2007, pp. 21-25, 2007.

[6] Siva Ram Murthy C, Manoj BS. "Ad-hoc wireless networks architectures and protocols," Pearson.Edu 2007

[7] D.A. Tran and H. Raghavendra, "Routing with Congestion Awareness and Adaptivity in Mobile Ad Hoc Networks," Proc. IEEE Wireless Comm. And Networking Conf. (WCNC), Mar. 2005

[8] G. Yashar and A. Keshavarzian, "Load Balancing in Ad Hoc Networks: Single-Path Routing vs. MultiPath Routing," Proc. IEEE INFOCOM '04, Mar. 2004.

[9] C.Gui [and P. Mohapatra, "SHORT: Self-Healing and Optimizing Routing Techniques for Mobile Ad Hoc Networks," Proc. ACM MobiHoc, 2003..

[10] Z. Ye, S.V. Krishnamurthy, and S.K. Tripathi, "A Framework for Reliable Routing in Mobile Ad Hoc Networks," Proc. IEEE Infocom, Apr. 2003

[11] S.Doshi and T.X. Brown, "Minimum Energy Routing Schemes for a Wireless Ad Hoc Network," Proc. IEEE INFOCOM, 2002