



Multipath Routing With Transit Route for Congestion Avoidance in MANETS

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Abstract: Data communication through wireless channels faces a challenging issue towards congestion and link quality variation. Regardless of stationary or mobile nodes in the network, the link between the nodes experiences a fluctuation in link quality. Congestion is an intriguing issue which occurs when there is a deterioration in QoS at the link which carries the data. The consequences of these problems are overcome by cooperative communication which has revealed a new path in research by uniting the nature of broadcasting in autonomous network and the link quality fluctuation. Our solution in tackling this problem is put forward as CARMAN (Congestion Avoidance through Cooperative Routing in MANETS). This CARMAN is triggered by setting a threshold value for "Number of hops" and the "Number of packets". There exists a methodology proposed as Cooperative Opportunistic Routing in Mobile Ad hoc Networks (CORMAN) which has an issue regarding congestion and also a problem towards multi packet transmission. These problems can be overcome by our proposed scheme. This scheme (CARMAN+BACKPROPAGATION ALGORITHM) compares the performance with CORMAN and AODV respectively. The simulation results show a drastic increase in packet delivery ratio and reduction in packet drop compared to CORMAN & AODV, thus proving the efficiency of the proposed scheme. This (CARMAN+BACKPROPAGATION ALGORITHM) helps in congestion and traffic control along the path. Also the overall time delay of the network is managed.

Keywords: Mobile Ad hoc networks, GW, CARMAN, AP, AODV, CORMAN.

I. INTRODUCTION

Mobile Ad hoc network is an arbitrary network with nodes wandering around. In this communication network, if the nodes transmitting data packets are not in range to each other, it requires other nodes to help in forwarding the packets. Due to deficient infrastructure support every node in the network acts as a router in transmitting the packets. The data packets are heard by the neighbouring nodes which are within its transmission range, while transmitting the packets in a wireless network through a physical channel. But due to interference overhearing of the packet is not intended. The main objective of the researches going on is to enhance the wireless networking performance to reach the wired networking ones. Mobile ad hoc network has some restraints in routing traffic. In traditional wired networks, data packets are not routed by the nodes but in MANET the packets are routed by the nodes and the nodes perform as routers. The data packets to be transmitted are routed to their destination by routing. Then data forwarding helps in deciding the way to transfer the data from one link to another.

Connectivity between Mobile Ad-Hoc Network (MANET's) and global internet or other external networks. Military communications are often group-centric, which means the exchange of information, such as voice and data, is typically among a subset (e.g. a squadron) of the total deployed set of forces. Group communications, often called Multicast, require enabling a set of resources that provide edges and paths among the nodes in the multicast group.

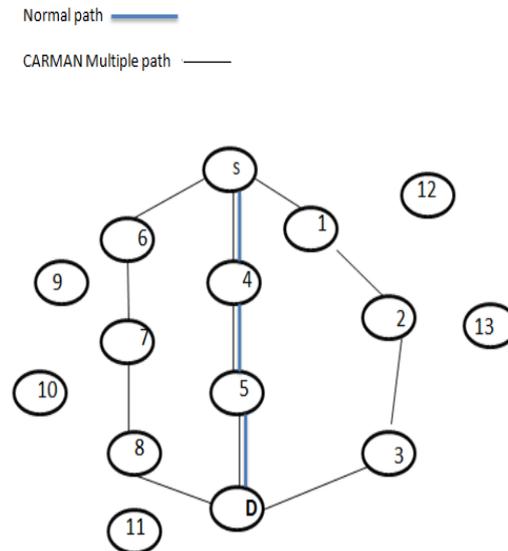
Thus there are three types of nodes in the network:

- **Gateway nodes:** They are routers that have one or multiple links directly connected to the global internet or external networks. These nodes are the main entrances into the global internet or external network. In frameworks where there is backbone subnet, these GW nodes are usually equipped with wired interface only.
- **Access points nodes:** These are bridges or routers that have both wired and wireless interfaces. They are thus located on the boundary between the wired backbone and the wireless ad-hoc subnet. They do not have links directly to the global internet, but they can reach the internet to the GWs.
- **Mobile nodes:** These are hosts or routers that usually are equipped with one single wireless interface. They are located inside the ad-hoc network, while GWs and APs are static nodes. MNs are mobile, and can freely move from one location to another within the MANET.

II. RELATED WORK

CARMAN helps in avoiding congestion and provides a network layer solution. It is an extension of CORMAN to provide pipeline transmission of data packets for long distance multi-hops transmission. This method reduces the stress at each node of transmission by splitting the data packets among many nodes. It allows pipeline data transmission for long

distance multipath transmission and also provides faster transmission of data packets avoiding congestion. CARMAN is based on the assumption that all nodes in the network are able to calculate the number of hops it needs to travel for that particular transmission. It is assumed that each node transmitting the data packets are able to calculate the number of data packets it carries. The increase in the number of packets prolongs the transmission time and thus making that path busy for a considerable period of time. This makes difficult in finding the shortest path for others requests through those nodes. Our CARMAN provides an efficient solution to overcome these problems. CARMAN is implemented in an autonomous network, where the transmission follows CORMAN methods. Proactive source routing (PSR) helps in data forwarding and also find the efficient path to their destination.



III. PROPOSED WORK

In a realistic solution, multiple flow of traffic are likely to exist in the network, due to which a congestion on a particular route if all nodes are likely to route the data through the same path. One possible way to achieve this is to incorporate some mechanisms for bandwidth monitoring or estimations. We have proposed a simple and cost effective metric algorithm that can be added to existing routing protocols and thus making transit routing achieve a higher throughput for intranet traffic. Our focus is to control the congestion occurred in the network. We use a close loop technique (back propagation algorithm) to control the congestion. We will use the back propagation at the gateway which is congested. In our case the node very nearer to the gateway will act as a source. Once the source node get slowdowns then its receiving queue get flooded and further if no any traffic re-assignment process is used at the source node then it will generate another problem.

Algorithm for Congestion Control-

1. Back-pressure solution is used at flooded gateway GW.
2. Once the Src1 node received the back-pressure it gets slow-down.
3. If (Incoming-Buffer = Full)
4. Use Traffic Re-assignment mechanism to control the congestion at source node.

Traffic Re-Assignment Mechanism-

The parameters related to nodes comprise the utilized ratio of buffers, load factor and utilized frequency of node.

Define 1- The buffer utilized ratio in node i is denoted as BO_i ,

$$BO_i = (\text{data_buffered} / \text{buffer_size}). \quad (1)$$

Define 2- The load factor of node i is denoted as Lfi .

$$Lfi = (Ri / Ci). \quad (2)$$

Define 3- Forwarding capability function of node i , denoted as $F(Lfi)$

$$0, (1 - Lfi) \leq 0$$

$1 - Lfi$, others

Define 4- Utilized frequency of node, denoted as Ui , means the number of paths using node i . For some paths of one source may comprise node i at the same time, the frequency isn't equal to the number of sources used.

A path in WSN comprises nodes $1, 2, \dots, i, \dots, m$, denoted as $P = \{1, 2, \dots, i, \dots, m\}$. Parameters related it comprises the utilized ratio of buffers, load factor and utilized frequency.

By considering all above parameters we will select another path within MANET to reassign the traffic

This is the proposed algorithm for multiple sources and multiple destinations. Initially, the algorithm was only for single source and destination. Here, we use two gateways which count to the half. Suppose that we have to move source 1 to destination 1, there is long path to travel but if we use the gateways, the destination to be travelled is reduced and the congestion in the way is also controlled. Hence, gateway is the best path to move to destination 1 and so on with least distance and traffic.

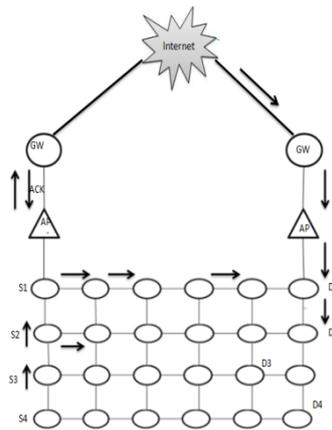


Fig. Proposed Topology

When the data packet is to be send from source 1 to destination 1,at that time the gateway 1 is congested and the gateway 1 will send an acknowledgement to source 1,then it will find a temporary path to send the data to destination 1.When the congestion at gateway 1 will be reduced then the data packets will again move from its original path.

IV. CONCLUSION

In this paper, a Congestion Avoidance through Mobile Ad hoc Networks(CARMAN) protocol is designed to overcome problems due to congestion. The focus is on traffic rearrangement policy that is able to redeem the problem due to heavy traffic in the network. When it finds the sign of congestion occurrence it triggers the CARMAN algorithm and transmits the data packets. The reassignment policy works here to find the alternate path passing through the MANET topology. This method achieves a higher throughput and packet delivery ratio.

REFERENCES

- [1] Vinh Pham et.al, “Routing of Internal MANET Traffic over External Network”, © 2008 ACM.
- [2] D. Couto, “A High-Throughput Path Metric for Multi-Hop Wireless Routing”, MobiCom '03, San Diego, September 2003.
- [3] R. Draves, et. al., “Routing in Multi-radio, Multi-hop Wireless Mesh Networks.” ACM MobiCom, Philadelphia, September 2004.
- [4] M. Michalak, “Common Gateway Architecture for Mobile Ad-hoc Networks”, Second Annual Conference on Wireless On-demand Network Systems and Services (WONS 2005), 2005.
- [5] M. Benzaid, et al., “Integration of Mobile-IP and OLSR for a Universal Mobility”, ACM Winet, Wireless Networks Journal, vol. 10 (4), July 2004.
- [6] Maurits de Graaf et al. “Easy Wireless: broadband adhoc networking for emergency services”, MedHoc Conference on ad-hoc networking (MedHoc07), 2007.
- [7] T. Clausen, P. Jacquet, “Optimized Link State Routing Protocol (OLSR)”, RFC 3626, October 2003.
- [8] C. Perkins et. al, “Ad Hoc On Demand Distance Vector (AODV) Routing”, IETF Internet draft, draft-perkinsmanet-aodvbis-00.txt, Oct 2003 (Work in Progress).
- [9] D. Johnson et. al., “The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks (DSR)”, draftietf-manet-dsr-09.txt
- [10] R. Ogieret. al., “Topology Dissemination Based on Reverse-Path Forwarding (TBRPF)”, IETF Internet draft, draft-ietf-manet-tbrpd-11.txt, October 2003.