

A Review on Techniques for Controlling the Congestion in MANET

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Abstract - MANET is mobile ad-hoc network where various wireless nodes intercommunicate to each other. As this network is temporary network. It is the network where source node communicates to the destination node. This network has limited resources. These resources are in the terms of bandwidth. So there is high chance of congestion. To avoid the network congestion various techniques are followed. Each technique has its own set of advantages and disadvantages. Each technique is followed with various types of overheads like less throughput, extra load to send the data from source to the destination.

Keywords - MANET, CRAODV, M-EALBM, Congestion

1. Introduction

A mobile ad hoc network (MANET) is a set of wireless mobile nodes that can communicate without any centralized administration. Due to its self-configuration, flexibility and distributed nature, it is used in many applications such as disaster recovery, search and rescue operations, military service, and vehicular networks. MANETs have many features, including multihop communication, dynamic topology, limited security and resources. These features create special challenges in routing protocol design. The main objectives of the MANET routing protocol are - maximize network lifetime, energy efficiency, network throughput and delay minimization. To achieve these objectives, many routing protocols have been proposed for MANETs. The routing protocols in MANETs are classified into three categories: proactive routing protocols, reactive routing protocols and hybrid routing protocols.

The designing of a reliable and efficient routing strategy is a very challenging problem in MANETs because of their mobile nature and limited amount of resources. In order to use these limited resources efficiently, an intelligent routing strategy is required which should also be adaptable to the changing conditions of the network, like, size of the network, traffic density and network partitioning. Mobile ad-hoc network shows unexpected behavior with multiple data streams under heavy traffic load such as multimedia data when it is send to common destination. The main reason for packet loss, protocol overhead, and delay to find

new route in MANET is due to congestion. So, In order to deal with all these issues, the routing in MANETs needs to be congestion adaptive due to these problems service quality is affected.

Congestion in MANET: Congestion is a situation in communication networks in which too many packets are present in a part of the subnet. Congestion may occurs when the load on the network (number of packets send to the network) is greater than the capacity of the network (number of packets a network can handle). Congestion leads to packet losses and bandwidth degradation and waste time and energy on congestion recovery [3]. In Internet when congestion occurs it is normally concentrated on a single router, whereas, due to the shared medium of the MANET congestion will not overload the mobile nodes but has an effect on the entire coverage area [4]. When the routing protocols in MANET are not conscious about the congestion, it results in the following issues.

Long delay: This holds up the process of detecting the congestion. When the congestion is more rigorous, it is better to select an alternate new path. But the prevailing on-demand routing protocol delays the route searching process.

High overhead: More processing and communication attempts are required for a new route discovery. If the multipath routing is utilized, it needs additional effort for upholding the multi-paths regardless of the existence of alternate route.

Many packet losses: The congestion control technique attempts to minimize the excess load in the network by

either reducing the sending rate at the sender side or by dropping the packets at the intermediate nodes or by executing both the process. This causes increased packet loss rate or minimum throughput.

Congestion Types: Congestion can be classified into four different types

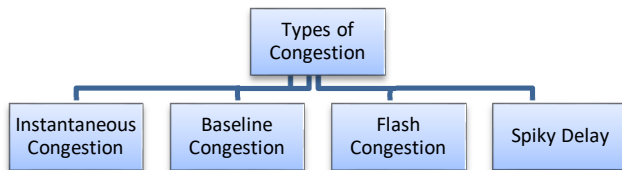


Fig. 1: Types of Congestion

- i) **Instantaneous Congestion:** It is caused by mild bursts, created naturally by burstiness of IP traffic.
- ii) **Baseline Congestion:** It appears to be caused by systematic under-engineering of network or hop capacity (or alternatively due to simple source overflow described earlier).
- iii) **Flash Congestion:** It suggests frequent but momentary periods of overload in a highly utilized network, where bursts from individual sources add up to create significant packet loss hills.
- iv) **Spiky Delay:** It a condition where no packets are transferred for a long duration of time - the transit delay of packets shoots up from few milliseconds to tens of seconds during this period.

2. Literature Survey

[1] **Amit Sharma (2016) et al:** Congestion Control is an advanced area in research and new development in mobile ad hoc network. Congestion occurs when resources are limited and demand is more. In this paper, they have proposed a new approach named as CRAODV for congestion control in MANETs and compare the same with the EDMR algorithm.

[2] **Neha Sharma(2016) et al:** This paper addresses hybrid approach to overcome congestion situation and avoid packet loss in wireless networks. Proposed Modified Hybrid approach is the variant of Hybrid-TCP (H-TCP) and TCP Reno. Proposed Modified Hybrid-TCP variant consider the rate of increment parameter based on signal strength and noise factor to estimate a accurate retransmission time. Proposed Modified Hybrid-TCP is simulated using NS2 simulator and evaluated according to size of congestion window, packet delivery ratio, throughput with respect to mobility factor (speed of node).

Performance observation concludes that proposed Modified Hybrid-TCP variant raises significant performance improvement during transmission over traditional TCP variants.

[3] **Kaoutar Ourouss(2016) et al:** Consuming less energy to evenly distribute the traffic load defines a major task for efficient routing protocols in Mobile Ad hoc Networks (MANETS). Indeed, this process can avoid congestion, increases the network lifetime and maintains consequently green communications.

[4] **Anupama Sharma(2016) et al:** This paper is based on the analysis to find out an efficient framework. MMDSR is very efficient algorithm for video streaming which can be embedded with this framework to enhance the performance. In this proposed framework traffic is sorted into categories according to their QoS requirements and priority. Admission of each flow drives through a special module which controls admission by traffic differentiation and prioritization of it. Resource adaptation module in framework is responsible for manage the resources and congestion control. Proposed framework may enhance the performance of MMDSR by managing entertained traffic in very regulated and mannered way.

[5] **Saumya Yadav(2016) et al:** Congestion detection is quite difficult in wireless network, because there are several reasons behind packet drop. In mobile networks, unsuccessful delivery could be due to the route breakdown as well because of the mobility of nodes. So congestion is not the only reason for packet losses. The congestion control approaches that are used in wired network cannot be directly applicable in wireless networks. This paper contains a survey on various existing congestion control techniques.

[6] **Arvind Kushwaha(2016) et al:** They provide a novel solution to transfer server load from one server to another server. Energy efficiency is a critical factor for operation of ad-hoc networks. Proposed algorithm will divert the load from low energy node to high energy node. The complete proposed solution will work to discover multipath routing for and congestion control and load balancing for MANET.

[7] **Dr. Vijay Laxmi(2016) et al:** Weight-based clustering algorithm in ad hoc network is an on demand clustering algorithm for multi-hop packet radio network. These types of networks are ad hoc networks and dynamic in nature due to mobility of nodes. Clustering in mobile ad hoc network can be defined as various partitions into various groups. It is an important concept of VANNET, because clustering makes it possible to guarantee of system performance, such as throughput delay and also security issues.

[8] **Dr. Vijay Laxmi(2016) et al:** In vehicular Ad-hoc network safety is one of the major issue for the researcher and it depends on the delivery of the information among the vehicles. Due to the recent advances in the hardware and technology the researcher has concern to improve vehicle

and road safety, traffic efficiency, and convenience as well as comfort to both drivers and passengers.

Table 1: Summarized analysis of congestion control mechanisms

Author Name	Paper Name	Technique Used
[1] Amit Sharma	CRAODV: A New Approach for Congestion Control in Mobile Ad-hoc Network	They Have Used CRAODV based technique. It is proactive protocol based technique
[2] Neha Sharma	Improved Congestion Control Mechanism using Modified Hybrid TCP in Mobile Ad-hoc Networks	Proposed Modified Hybrid approach is the variant of Hybrid-TCP (H-TCP) and TCP Reno. They Have improved the performance of the network
[3] Kaoutar Ourouss	Mobility Based Investigation of load Balancing and Energy Efficiency of MANETS Routing Protocols	Consuming less energy to evenly distribute the traffic load defines a major task for efficient routing protocols in Mobile Ad hoc Networks (MANETS). Indeed, this process can avoid congestion, increases the network lifetime and maintains consequently green communications.
[4]Anupama sharma	Performance Enhancement in MMDSR through Information Management	Proposed framework may enhance the performance of MMDSR by managing entertained traffic in very regulated and mannered way.
[5] Saumya Yadav	Medium node overhead	In mobile networks, unsuccessful delivery could be due to the route breakdown as well because of the mobility of nodes. So congestion is not the only reason for packet losses.
[6]Arvind Kushwaha	M-EALBM: A Modified Approach Energy Aware Load Balancing Multipath Routing Protocol in MANET	They provide a novel solution to transfer server load from one server to another server. Energy efficiency is a critical factor for operation of ad-hoc networks. Proposed algorithm will divert the load from low energy node to high energy node. The complete proposed solution will work to discover multipath routing for and congestion control and load balancing for MANET.
[7] <i>Dr. Vijay Laxmi</i>	Trust Factor Based Secure Congestion Control For VANET	Weight-based clustering algorithm in ad hoc network is an on demand clustering algorithm for multi-hop packet radio network. These types of networks are ad hoc networks and dynamic in nature due to mobility of nodes. Clustering in mobile ad hoc network can be defined as various

		partitions into various groups. It is an important concept of VANNET, because clustering makes it possible to guarantee of system performance, such as throughput delay and also security issues.
[8] Dr.VijayLaxmi (2016)	A Comparative taxonomy on Routing Protocols of VANET	In vehicular Ad-hoc network safety is one of the major issues for the researcher and it depends on the delivery of the information among the vehicles. Due to the recent advances in the hardware and technology the researcher has concern to improve vehicle and road safety, traffic efficiency, and convenience as well as comfort to both drivers and passengers.

3. Problem Definition

Mobile ad hoc networks properties like dynamic topology and decentralized connectivity make routing a challenging limited buffer space becomes full and as a result the extra data (new or old) have to be dropped. This leads to both waste of communication and resources like bandwidth of the nodes and also obstruct the event detection reliability because of packet losses. Therefore, routing protocols that can evenly disperse the traffic between mobile nodes and therefore can enhance the performance associated with MANETs are expected. So there requires this type of technology that may send your packet via multiple paths in which, if a part of the data will be dropped from any node, it will not cause loss by the end when it is assembled because it will reach from other nodes within the network. This type of technique will overload the network. Because same message will be sent to the multiple paths simultaneously by considering this thing that the packets will be dropped on one or more route due to the traffic.

4. Proposed Technique

In our new approach we will use another algorithm for controlling the congestion. This technique is based on sending the control bit to the network for congestion request. Any node to the destination if has congestion in the network will reply back to the source in unicast way such that source will come to know the status of the network. And will send the packet on to the route which is most optimal route so that the successful completion of the communication can be taken place. This technique we will apply in to the OLSR protocol. So that it is tested on another

task. When the nodes receive more data than it can forward, the “redundant” data has to be buffered, then Congestion occurs because the

protocol. So that it become clear that this technique works on another protocols as well.

5. Objectives

1. To establish the network based on MANET (mobile ad-hoc network) using OLSR.
2. To implement the multipath packet transmission based on existing technique on AODV.
3. To implement the new technique based on sending the control signal on the routes for checking the congestion status of the nodes lies into intermediate to the destination over to the network having OLSR protocol.
4. Performs the comparative analysis of both the techniques on different parameters over to the two different protocols.

6. Conclusion

From the above study it is clear that different researchers have put different techniques for congestion identification and removal and there are different reasons for congestion. Due to congestion the deterioration of the network also is taken place. There must be some strong technique using which congestion can be avoided.

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