

A Survey of Performance of Congestion Control Techniques in MANET

Komal badhran, Gautam gupta

Abstract -In MANET nodes are mobile and communicate with other nodes through wireless connection. The nature of MANET is dynamic so route discovery is quite challenging task. In MANET congestion will be occur at several nodes and it is not an easy task to control the congestion. The main aim of the congestion control is to assure the system is running at its rated capacity even in worst condition. The congestion less based routing is established to reduce the packet loss, number of nodes, changing topologies, varying no. of senders , changing the location of sink in the network. The main objective of this survey paper is to study and analyze various route optimization techniques and performance evaluation of existing congestion control techniques.

Keywords- MANET, Quality of service ,throughput, delivery ratio,AODV

I. INTRODUCTION

Mobile Ad-Hoc Network

A MANET is composed of the mobile nodes without any infrastructure. The goal of MANET to extend mobility into the field of the autonomous, mobile and wireless domains, where a set of nodes form the network routing infrastructure of an Ad-hoc fashion. The majority applications of MANETs are used where rapid development and dynamic reconfiguration are more necessary and wired network is not available. The MANET include military battlefields, army operations, emergency search, rescue sites, classrooms and conventions etc where participants share their information dynamically with help of their mobile devices. These applications help in performing various multicast operations. Due to mobility of nodes in MANET, it is not possible for establish fixed paths for message delivery and packets

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through the network. Hence, congestion is occur and it is the key problem for MANET

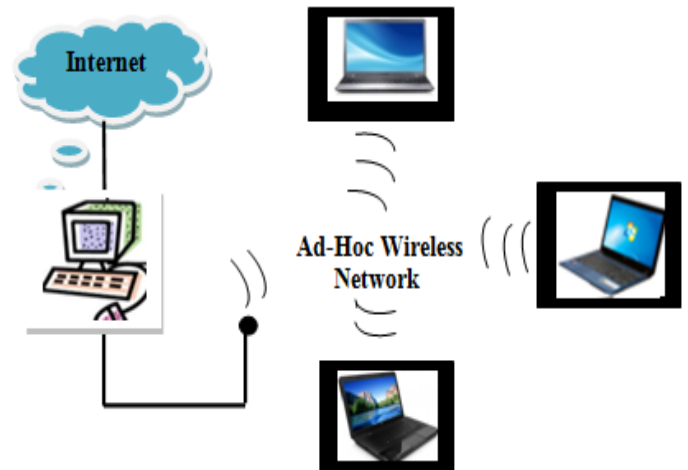


Figure 1: The General Representation of Mobile-Ad-Hoc Network

Congestion in MANET

Congestion is situation in communication network when too much traffic is occurred and the Congestion occur on MANET leads to delay, packet losses, bandwidth degradation, wasting of time, high overhead. So many routing protocols have been designed to proposed to overcome the congestion in MANET.

Congestion Control in MANET

Packet failure in MANETs is primarily caused due to obstruction. Congestion control over a mobility and failure of adaptive routing protocol at the network layer can condense the packet loss. The congestion of non-adaptive routing protocols leads to the following difficulties:

(a)Extensive delay: Most of the congestion control technique takes much time for detecting congestion. Sometimes the usage of new routes is more critical situations. The main problem occur delay stirring for route searching in on-demand routing protocol.

(b)More Overhead: Congestion control mechanism takes more efforts for processing and communication in new routes. It also takes more and more effort in maintaining the multipath routing protocol.

(c)Heavy packet losses: Once the congestion is detected and packets may be lost. Now congestion control is maintained

by decreasing the sending rate towards the sender or dropping packets at the intermediate nodes. There is another method is to decrease the traffic load. Due to high packet loss on congestion control small throughput may be occurred.

Routing Protocols in MANET

One of the popular routing protocol is AODV which is used to send the messages and packets over MANET and also is used to overcome the problem of congestion in MANET. But it depends on the individual receivers to detect congestion and control their receiving rates. Another routing protocol EERCCP is better than AODV but sometimes it fails to give the better result when relay node gets in trouble. On the other hand there is no other mechanism to select an alternative relay nodes i.e. Lack of cooperation between the routing protocol. Hence we proposed another routing protocol named as EECCCP. It defines the benefits of energy efficiency and cooperation which reduces the congestion effectively.

The proposed EECCCP will perform better than both the AODV and EERCCP. This proposed scheme does not cause any effect and significant changes on the queuing, scheduling or forwarding policies of existing network routing protocols. Simulation results have been shown that the proposed routing protocol EECCCP has many advantages better delivery ratio and throughput. This protocol having less delay and energy consumption as compared to with existing protocol AODV and EERCCP.

Security Threats And Vulnerabilities In The MANETs

Due to the inherent property of the MANETs should be structure-less, dynamic, configure and sustain in nature. And there exist cause some potential loop holes and vulnerabilities in MANETs. It can be attacked and exploited by the malicious and undesirable nodes to disrupt the smooth functioning of the network. Some of the common attacks in MANETs are:

(a) Impersonation or Spoofing

The objective of this attack was to hide the real identity of the attacker. In this attack, the attacker assumes the identity of more trusted node in the network. By doing this other nodes include the malicious node in their routing path and the malicious node can disrupt the normal function of the network without being notice

(b) Black-hole Attack

The purpose of this attack is to increase the congestion in network. In this attack the malicious node does not forward any packets forwarded to it, instead drops them all. Due to the attack packets forwarded by the nodes do not reach their intended destination and the congestion within the network escalates due to retransmissions.

(c) Sink-hole Attack

The idea of this attack was to attract all the network traffic towards itself. The attacker execute the attack by making the neighboring nodes believe that shortest path of the destination is through it. This attack causes the other nodes to relay all the traffic through the malicious node so that the

attacker can modify, fabricate or listen to the received packets.

(d) Wormhole Attack

The main aim of this attack is to replay the packet on the other side of the network. This attack is to be executed by the two nodes collapse to form a wormhole. The attacker on one side make the nodes believe that distance within the destination is just one hop, which it is greater than another hop. This causes the attacker to attract all the traffic from one side of the network and relay it to the wormhole. The attacker on the other side relays the same packet. By doing this

attacker can drop the packets or obtain any service illegally.

(e) Sleep Deprivation

The goal of attacker in this attack is to keep the target node busy. This attack is initiated by flooding the network with routing traffic and making the node consume all of the computing and battery power. This attack target the node in consuming the battery, network bandwidth and computing power by requests for existent or non-existent destination nodes, so that it cannot process the legitimate requests.

(f) Rushing Attack

The purpose of the attack is to include the malicious node in the routing path. During the routed phase the RREQs are forwarded by the malicious nodes to the neighbour of the target node. These RREQs are quick to reach the neighbouring nodes. When a neighbouring node receives RREQ from the attacker, it will not forward any request originated from source node that initiated route discovery. By executing this attack the attacker includes itself in the with the packet Routing table and can then tamper.

(g) DoS Attack and Flooding

The aim of this attack was to cripple the smooth functioning of the network. This attack is accomplished by sending the packets into the network that causes the targeted node in the network to process them and keep them occupied resulting in the crashing of that node. By executing the attack, attacker keeps the targeted node busy in processing its fabricated.

MANET Performance Analysis

Performance of proposed protocol is evaluated using the following metrics:

(a) Packet delivery ratio

Packet delivery ratio defines it is the ratio of no. of packets originated by the CBR sources to the no. of packets received by the CBR sinks to the final destinations.

(b) Average delay of data packets

This includes delays caused by buffering of data packets during route discovery, queuing occur at the interface queue, retransmission delays at the MAC.

(c) Normalized routing load (NRL)

NRL is the no. of routing packets transmitted at data packet delivered to the destination. This system analysis is made from the graph sources. In this analyze various parameters of NRL with respect to varying time.

LITREATURE SURVEY

John hobby et.al (2008) is used to solve the problem of scheduling and congestion control in MANET. In recent years a number of papers have been presented to this

problem that are based on combining differential-backlog scheduling algorithms which based on congestion control. However this work does not address a number of issues such as how signaling is performed and new algorithms interact with the wireless protocols.

- The author define a specific network utility maximization problem that believe is appropriate for MANET.
- The author describe wGPD algorithm for combined congestion control and scheduling.
- The author show how the wGPD algorithm and signaling can be implemented with minimal disruption to existing wireless protocols.
- The author shows via OPNET simulation that wGPD standard protocols such as 802.11 operating in conjunction with TCP.

John papandriopolous et.al (December 2008) seeks distributed protocols that attain the optimum allocation of transmitter powers and source rates in a cross-layer design of a MANET. Although the network utilization is nonconvex in nature. Convexity plays a major role. The author provide new convexity formula and it allows use a SIR approximations that have almost become entrenched in the literature.

Three protocols are developed:-

- The first based on a convergence of the underlying problem.
- Second protocol relaxes this requirement and involves sequence of convex approximations each existing TCP protocols for source rate allocation. Message passing only used for power control. Our convexity results again provide sufficient conditions for optimality.
- Third protocol is motivated by a desire of power control of message passing, is optimal scheme that makes use of noise measurements and enjoys a convergence rate that is faster than existing methods

Addisu Eshete and Yuming Jiang et.al (2011) S-SFQ which is a single queue design and implementation of the SFQ. This aggregate queue orders packets based on their timestamps rather than order of arrivals. The author shows the performance gains of S-SFQ over other schemes such as RED and FIFO in terms of link utilization and flow fairness. The author discuss in the adverse effect of packet loss synchronization. The qualities of queue based router scheme easily taken away by this problem. Loss synchronization occur during overloaded.

Prof.K.Srinivas and Prof.A.A.Chari et.al (September 2011)MANET have an important part of future wireless systems. The wireless networks challenged the OSI layered design. In order to provide high capacity wireless access and support new multimedia network. The various OSI layers network functions should be considered together while designing the network. In this paper the author give brief discussion on current stage of performance optimization challenges like energy efficiency, cross-layer design and congestion control.

Kaushik R.Chowdhury et.al (2012) that Cognitive radio networks allow users to transmit in the spectrum bands, as long as performance of the primary users of the band is not degraded. The author approach incorporates spectrum awareness by a combination of explicit feedback from the intermediate nodes and destination. This is achieved by adapting the classical TCP rate control algorithm by the source interact with physical layer channel information. The link layer function is spectrum sensing, buffer management and predictive mobility framework. An analysis of the throughput in TCP CRAHN is provided.

Michael Menth et.al (April 2012) PCN is a technique for IP networks to notify nodes of PCN domain whether the traffic rate on some links exceeds the certain configurable bounds. The author discuss and analyze their performance in the presence of traffic or within multipath routing of simulation and mathematical modeling. Such situations can be integrated by insufficient flow traffic, long round-trip times, on/off traffic, delay media, inappropriate marker configuration and smoothed feedback.

S.Sheeja et.al (2013) Mobile nodes are organised without any access in MANETs. Due to the mobility of nodes, the congestion occurs. So many congestion control techniques were proposed to avoid the congestion. In this research work the author proposed to develop the ECAS which consists of congestion monitoring, effective routing technique and congestion free routing. In routing technique the author proposed particular channel in terms of queue length of packet, packet loss rate and packet dropping ratio to maintain the congestion status. The congestion free routing is established to reduce the packet loss, high overhead, long delay in the network.

Anju,Sugandha Singh et.al (2015) that wireless network is a collection of wireless devices which uses for temporary network. Traffic control is an effective method for controlling congestion. But it presents a number of drawbacks which are not easy to ignore. The most important that higher traffic load occurs. The main aim of the congestion control is to assure that system is running even in worst condition like overload situation. By controlling which packets are injected in the network, the amount of information that reaches the data sinks reduces.

TABLE

AUTHOR	YEA R	TECH NIQUE	FINDI NGS
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John hobby	2008	Differential backlog scheduling algorithm	wGPD protocol for combined congestion control and scheduling in MANET
John papandriopoulos	2008	Non-linear optimization	Cross layer design problem for MANET
Addiseshet and Yumingjian	2011	Pre flow queueing and Pre dropping algorithm	SFQ design using a single queue
Prof.K.Srinivan and Prof.A.A.Chari	2011	Congestion adaptive routing	Building blocks for application specific protocol stack
KaushikR. Chowdhury	2012	Transport protocol for CRAD-HOC network	Implementation of TCP CRAHN protocol
Michael Menth	2012	QoS for high priority traffic in IP network	Various control method using pre-congestion notification
S.Sheeja	2013	Effective congestion avoidance scheme for MANET	Mobility based congestion control scheme

Anju,SugandhaSingh	2015	Modified AODV for congestion control in MANET	Traffic bottleneck is a major issue in congestion control
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CONCLUSION

Various papers have been studied for congestion control. wGPD protocol is designed for combined congestion control and scheduling in MANET. Routing Protocol having throughput is high and less delay. The QoS enabled mobility based routing algorithm calculates multiple disjoint paths. Congestion is reduced by varying no. of nodes. Ant based multicast routing algorithm achieve higher packet delivery fraction (PDF) with reduced overhead

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