



INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

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REVIEW ON VARIOUS CONGESTION CONTROL ALGORITHMS IN MANET

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Accepted Date: 15/03/2016; Published Date: 01/05/2016

Abstract: Mobile ad-hoc network (MANET) is a wireless network and MANET is a self-configurable network, MANET uses the wireless connection to connect various hops of the network, MANET's suffering from various issues and challenges due to number of hop transfer the packets over the network. Congestion is the biggest problem in MANET, congestion means when number of packet transmit over the network is greater than the capacity of the network. Increasing the congestion over the network leads to packet losses. MANET does not any fix infrastructure network and the hops are free to move within the network, so the topology may change dynamically. There are many proposed algorithms or techniques that are congestion adaptive and deal with the congestion over the network. In this paper, different congestion control algorithms or techniques have been discussed. The purpose of this paper is to discuss and compare various proposed congestion control algorithms or techniques in MANETs.

Keywords: MANET, Congestion, Congestion Control.



PAPER-QR CODE

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How to Cite This Article:

Navaid Ahmed Khan, IJPRET, 2016; Volume 4 (9): 1251-1259

INTRODUCTION

Mobile ad-hoc network (MANET) is used to connect two or more hops together for sharing purpose. Hops can share a data without having any fix infrastructure and this network does not require any centralize administrator, each hop in the network act as a router which helps forwarding packet from one hop to another in MANET hop can be a personal devices which is like laptop, personal computer (PC), PDA's, mobile phones etc [1]. MANET used the wireless connection to connect different networks and we can't choose the specific path to transfer a data because the hops are freely move in MANET and it may randomly change the topologies [2]. There are many issues and challenges in the mobile ad-hoc network. In MANET congestion control is one of the challenging task. Congestion occurs when sufficient resources are not available and demands for a work are more [3].

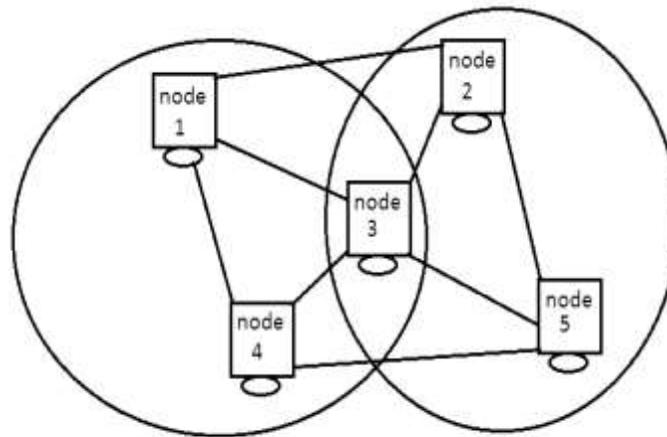


Fig.1. Example of Mobile Ad-Hoc Network

Fig.1. Shows the example of mobile ad-hoc network in which if the node1 wants to share the data with the node5 and that node3 are not in the range at that time node 3 act as a router to establish the connection between them. In MANET each and every node acts as a router.

Mobile ad-hoc network (MANET) is a kind of wireless network, in which each user can directly communicate with the other users via access point or base station. MANET doesn't have any pre existing infrastructure, so users are allow to move freely anywhere in the network. In running days most of the users have mobile phones and they access their mail on mobile phone as well, MANET allow the users to stay connected with the network even if they are travelling, and can also access the network from anywhere any place. Mobile ad-hoc network dynamically change the network topology, as users are free to move. It helps to the users to be update with

the current trends. User can leave or join the network whenever he wants and can use the services of the network [4].

Following are some important points about MANET [5].

- User can easily access the network.
- User can share a data as fast as possible.
- Distribute network traffic among the hop.
- Decrease packet transfer data rates and try to break up the congestion.
- Identify the congested network and try to remove congestion from it.

Congestions in MANET:

Congestion is situations in communication network in which number of packets are exist in piece of subnet. Congestion may occurs when the load on the network (number of packets send to the network) is more than the capacity of the network (number of packets can handle by the network). Congestion leads to packet losses and bandwidth degradation and waste of time and energy on congestion recovery. When congestion occurs in the internet it is normally concentrated on a single router, where as, due to the shared medium of the MANET congestion will not overload the mobile nodes but has an effect on the entire coverage area. When the routing protocols in MANET are not conscious about the congestion, it results in the following issues [3], [6].

➤ **Long Delay:-**

This endures the process of detecting the congestion. When the congestion is more rigorous. It is good to select a new path in alternate way. But the Major issue is the delay movement associated with the route searching in ad-hoc on demand routing protocol.

➤ **High Overhead:-**

To determine the new route, more processing and communication are required. 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 techniques attempts to decrease the load in the network by either reducing the sending rate at sender side or by dropping the packets at the intermediate nodes or by executing both the process. This causes maximized the packet loss rate or minimize throughput.

2. Related Work:

Congestion Control in MANET:

Different congestion control mechanism and techniques is used to control the congestion in the ad-hoc network and keep the load (over the network) below the capacity. It is a mechanism that can control the congestion, before it occurs, or remove the congestion, after it occurs. Main objective of congestion control is to manage the numbers of packets within the network [7]. In this no separate background network for the congestion control so the control of the congestion distributed among the network [8]. Congestion control algorithm is used to avoid the packet losing [9].

Following are the techniques used to control the congestion in the ad-hoc network [7].

➤ **Adaptive Congestion Control:**

Adaptive congestion control is a learning capability mechanism, this is used to accommodate dynamically changing network condition to maintain firmness and good performance. Then send the feedback to the sender to change the sending rate according to the current network conditions. It is measurable with respect to changing delays, bandwidth and the number of users utilization in the network.

➤ **Rate Control Protocol:**

Rate control protocol (RCP) is congestion control algorithm design to make the download time faster. In the today internet RCP is designed for simple flows of typical users.

i. End-host congestion control layer that sits between IP and TCP/UDP.

ii. Each router maintains a single fair-share rate per link.

➤ **Explicit Congestion Control Protocol:**

XCP is used for best effort traffic purpose and it is a window based congestion control protocol. Sender maintain their congestion window and round trip time (RTT) and communicate this to routers via congestion header in every packet.

Mobile ad-hoc network (MANET) has highly dynamic in nature, so congestion is become a big issue [10]. Mahammad Mastan, P.Suresh Verma, Mohammed Ali Hussain et al [5], suggest the various congestion control algorithms and some techniques also to avoid the congestion from the ad-hoc network and make the network congestion free. Vishnu Kumar Sharma and Dr. Sarita Singh Bhadauria et al [11], present the comparison of general AIMD-based congestion control method (GAIMD) with equation based congestion control method. GAIMD are used to maintain the throughput smoothness in MANET, but identically they demand only a less throughput than the competing TCP flows. This also study the agent based congestion control routing. Ravinder singh and Sanjay Gurjar et al [12], represent the simulation model and performance evaluation metrics of congestion control, in different ad-hoc networks every hop has distinct capabilities with limited capacity and battery life and the performance metrics is used to measure the performance of routing protocol in the different ad-hoc network. Sreenivasa B.C, G.C. Bhanu Prakash and K.V. Ramakrishnan [13], gives the clone techniques or algorithms for the congestion control and gives the comparison of several techniques and also represent its simulation parameter graph and the performance graph of all those techniques.

Congestion Control Algorithms in MANET:

Several congestion control algorithms are given below [5].

A. RED (Random Early Detection) Algorithm:

RED algorithms had been proposed to be firstly used in performance of AQM (active queue management) [5], [14]. The average size of queue is calculated at the arriving of each packet, which means exponential weighted moving average (EWMA) [5]. The estimation of standard size queue is differentiating by means of minimum and maximum threshold to create after that accomplishment.

B. Choke Algorithm:

Most of the time new packets are appear to take place at congested gateway router, randomly a packet is pull out from the FIFO buffer, and the packet is ten differentiate through the arriving packet. But in concurrence together belong to the same flow in the network afterward both are dropped, also the packet that was select randomly be kept integral as well as the fresh arriving

packet enters in to the buffer through a possibility depending going on the phase with congestion. It will be the computation of possibility is the same as RED. This is stateless and easy algorithm where no single data structure is required. Though, this algorithm be not present fit while amount of flows is huge when compare to the buffer space [5], [15].

C. Drop Tail Algorithm:

Drop Tail (DT) algorithm is the easiest and more broadly used in the current networks, and it's work based on first in first out (FIFO) manner having limited size of queue [16]. as the packets drops from the full queue buffer tail. This algorithms big advantage is suitability, effortlessness to its decentralized nature and dissimilarity. Though, this algorithm also has some several disadvantages, such as no security alongside the mischievous or non-responsive flows, lack of fairness and no comparative QoS (Quality of Service) [5]. This type of transmitting the content is complicated in the current Internet and network through DT.

D. REM (Random Exponential Marking) Algorithm:

REM is a fresh mechanism used for congestion control, as it focus to accomplish more consumption of link scalability, capability, delay and minimum loss. Its major limits are it does not give reason to cooperative sources and correctly considered and strict value of ϕ have got to be popular internationally [5]. In REM active queue management technique are capable to reduce the congestion from the network [17].

E. VQ (Virtual Queue) Algorithm:

The VQ algorithm is an important method. A virtual queue is maintained in this scheme and a link with similar approach as a real queue. Though, the ability of the implicit queue is minor than the capability of an actual queue, and the packets are dropped virtual, after that all packets by now enter in real queue and every new incoming packet are noticeable awaiting the virtual queue become empty again [5].

F. Fair Queuing Algorithms:

The Fair queuing algorithms (FQA) are generally used in the multimedia incorporated services networks for their interruption bounding in the flow and fairness. The frame building a class of FQ is called as weighted round robin, everywhere a router queue arrangement system is used in queues are service in fashion like round robin in fraction to a weight assign for every queue [5].

G. Adaptive Virtual Queue Algorithm:

The Adaptive virtual queue algorithm has the ability of the link and the needed consumption maintains a virtual queue at the link. The aptitude and buffer size of the virtual queue is similar to the real queue. On the arrival of each packet, the virtual queue capacity is updated. The adjustment of virtual queue algorithm does not suitably follow the varying traffic model at flow in the network, and it is also FIFO base approach [5], [18].

CONCLUSION:

MANET is not having any fix infrastructure so hops are free to move and share data among the nodes and also the hop act as the router in the wireless ad-hoc network. It is cost saving network there is no need to apply the separate router over the network. In MANET congestion is the biggest issue. In MANET congestion occurs when packet transfer over the network having lager capacity than of the existing network. In this paper we have studied various congestion control algorithms it seems that RED (random early detection) algorithm is best out of tem, because it use the AQM (active queue management) technique to control the congestion in MANET.

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