International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 2 Issue: 9 2738 – 2741

Congestion Detection and Avoidance in Dynamic Networks

K.Rangaswamy[1] Dr.Pandurangan Ravi[2] Y.Subba Reddy[3] Y.Sreedhar[4]
[1] Assistant professor, Department of CSE, CBIT, Proddatur, Y.S.R (dist), A.P-516360
[2]Principal, CBIT, Proddatur, Y.S.R (dist), A.P-516360
[3] Head Department of CSE, CBIT, Proddatur, Y.S.R (dist), A.P-516360
[4] Assistant. Professor, Department of CSE, CBIT, Proddatur, Y.S.R (dist), A.P-516360

***Abstract*--**Identifying the occurrence of congestion in a network is a major task. The congestion can occur in any intermediate node when the data packets are being transmitted from source to destination. The congestion will lead to high packet loss, delay and wastage of band width. There are several approaches propose for detecting and overcome the congestion in the network. In this paper propose dynamic congestion detection and control in the network. Here using average router buffer length the router detect the maximum congestion level, if the threshold value is exceed the limitation one CRP (Congestion Report Packet) packet will be generate it forward to all its neighbors and sender too with the help of ICMP Protocol. And by using Rating technique easy to control the congestion.

Key Points: *Congestion, CRP, ICMP, Queue length, rating technique.*

*****

1. Introduction

In dynamic Networks don't have a fixed infrastructure; it is a collection of notes and transmission lines. In a network each node acts as a router, which helps forwarding the packets from source to destination. In OSI reference model congestion control is the responsibility of the transport layer. However recent research has found that the users' access speed has increase and thus affects the efficiency of the network. New techniques are required to improve the efficiency of network traffic. The current assumption the networking research effects on individual network flow quality of service. Including loss of the packet, variation of delay time and wastage of the bandwidth. One way to reduce the load on the router is to increase the Maximum Transmission Unit (MTU) of the network. The data packet length exceeds the MTU then applies fragmentation method and divided into equal length of packets and inject to the network. The major problem is to find the appropriate route path to respective destinations and a network or geographical areas with more overhead for add on responsibility. If any drop of data, warning bit used to create the traces for data and will complete the duplicity of data. This mechanism will avoid big overhead which is introduced due to complete duplicate copy of data with each vehicular node agent so to decrease the congestion. The main objective is control the congestion by monitoring the network, if any problem in the network pass the information and solve the problem. This paper we introduce CRP packet to detect the congestion and control the congestion. We are considering best-effort connectionless packet-switched networks where link capacity is typically fixed. Given that link bandwidth (and hence overall bit rate) is fixed, network operations which deal with bit rates may be useful. For example, if routers can feed back rate information to sources of traffic flows, then the routers can participate in the fair allocation of link capacity. Transport protocols which are rate-based can admit packets into the network uniformly spaced: this helps to prevent short-term congestion. Combined, these techniques can be used as a form of congestion control, by allocating rates to traffic flows which keep network operation at the knee-point of peak power

2. Related work

1. Congestion Detection: Set the minimum and maximum threshold value of queue length.
2. The minimum is 0.35 of buffer size.
3. The maximum is 2*0.35 minimum of buffer size.

Case 1: If the queue status is < minimum threshold.

The incoming traffic is low and queue is in safe zone.

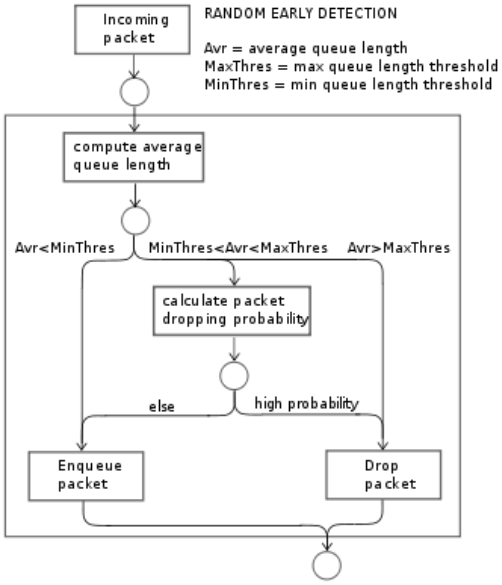
Case2: The queue status > minimum threshold and Inst_queue < maximum threshold.

The incoming traffic is normal and queue is in congested zone.

Case3: Inst_queue>maximum threshold.

The incoming traffic is heavy and queue is in congested zone.

Sample state chart Diagram:



2.1 Route Discovery

While the transmission of packet from source to destination, suppose intermediate node detect the congestion it generate warning message to its predecessor and successors nodes. These nodes are attempt to identify the alternative path destined for destination. In the dynamic network the routers make dynamic path towards the destination.

2.2 Dynamic Routing Algorithm

In Dynamic environment router make independent path from source to destination. In Adaptive method every data packet having full length of address. Best dynamic algorithm is

Link state algorithm :

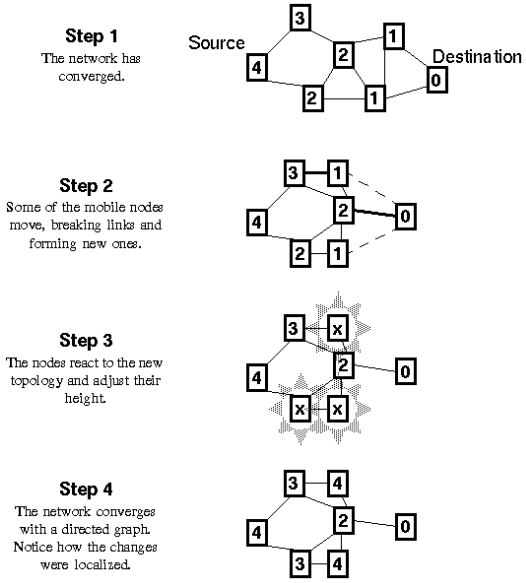
The main principles of link state algorithm Each router keeps a topology database of whole network link state updates flooded, or multicast to all network routers compute their routing tables based on topology often uses Dijkstra's shortest path algorithm. Mainly it consists of several operations in link state algorithm:

Step1: Finding of routers which are physically connected to the routers and also its IP address**.** When router starts working it will send the "HELLO" packet over the network. All routers within the network will receive the message its replays the ip address of that particular router.

Step2: Delay time for the neighboring routers in the network will be measured. Routers will send the Echo packets over the network, every router that receives these packets replies with an Echo reply Packet. By dividing the Round Trip Time by 2, routers can count the delay time. The Round Trip Time is a measure of the current delay on a network, found by timing a packet bounced off some remote host. This time includes the time in which the packets reach the destination and the time in which the receiver processes it and replies.

Step3: Router will broadcast all its information over the network for other routers and receives .Thus all routers share their knowledge and broadcast their information to each other and each router is acquainted with the structure and the status of the network.

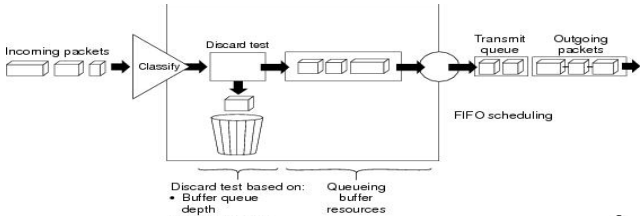
Step4: The router will evaluate the best route between two nodes of network**.** Thus the best route for the packets to every node is chooses. For this evaluation the shortest path algorithm of Dijkstra is performed.



III.Dynamic congestion detection and control

Network is a telecommunications network that allows computers to exchange data. Networked computing devices pass data to each other along data connections. Data is transferred in the form of packets. A packet consists of two kinds of data: control information and user data. The control information provides data the network needs to deliver the user data, for example: source and destination network addresses, error detection codes, and sequencing information. Typically, control information is found in packet headers and trailers, with payload data in between.

3.1 Sample Packet Transmission process:



 ISSN: 2321-8169
2738 – 2741

3.2 Congestion Estimation

Congestion in a network signifies that a node at any interval became congested and started to lose packets. Several metrics are available to monitor the congestion status at node level. For instance, it could be based on the average queue length and the percentage of packets discarded for lack of buffer space. Every second, a node checks the occupancy of its link layer queue using the dynamic congestion estimation technique so as to detect congestion well in advance. The dynamic congestion

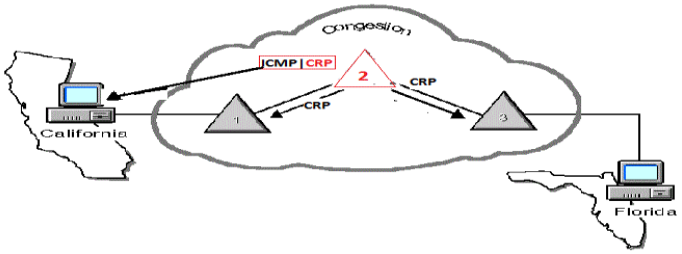
(DC) estimation technique is a queue management algorithm that makes use of a direct measurement of the congestion status. In this situation, our algorithm introduces the Queue_utilization parameter, which will help to change the Maxth values dynamically until the alternative path discovery becomes true. We used expression (5) to get Queue_utilization value (Minth= 35% Queue_size; Maxth= 70% Queue_size; and Queue_utilization = 87.5% Queue_size), which consists of three ranges. It varies from 85% to 90% queue size with 2.5% difference. Finally, if the average queue length is greater than Maxth, then node's congestion status becomes Zone-III (congested zone). The algorithm for dynamic congestion estimation is shown in Algorithm I

Algorithm I: Dynamic congestion estimation

```
//initialization
Avgnew = 0
Avgold = 0;
Inst_que = 0
Minth = 0.35 * queue_size
Maxth = 2*Minth
Queue_util[] = {0.85,0.875,0.9}
Wq = 0.002;
Warn_line = queue_size / 2
//For each arriving packet in the queue
  Inst_que++
//Calculate average queue size
  If the queue is not empty then
  Avgnew = (1-wq) Avgold + Inst_que * wq
  If (Avgnew < Minth && Inst_que < Warn_line) then
  Begin
  Queue_status = "Safe";
  Else if (Avgnew > Minth && Avgnew < Maxth) then
  Begin
  Queue_status = "Likely to be congested";
// Initiate Alternate Route Discovery Process
  If (Inst_que > Maxth && alter_path = FALSE) then
  Maxth = Queue_util[i++]*buff_size;
  Else
  Queue_status = "Congested";
  Avgold = Avg;
  Wq = Wq*N*P
  End
  End
  For each departing packet in the queue
  Inst_que - -
```

3.3 CRP Generation and Performance

If the congestion is occur, CSP packet generated by congested router and it forward to their neighbours and directly transmit to sender through ICMP protocol. The sender check the status of CRP packet the packets itself show the information about present list of the packets in the router buffer, if buffer is become overflow then sender give rating for the buffered packets, that message forward to the congested router with help of urgent pointer. The router discarded packets those are having less priority finally congestion will be reduced certain amount.



Algorithm II: Receive CRP at predecessor node

Input packet p = (cong_status, src_addr, dst_addr) to all the Valid entries

/* Src: source node; Dst: destination Node; Cong_status – neighbour

Congestion status*/

Begin

Construct new node set from current node to destination

Call route discovery process

/* find a new route from current node to destination */

Update new node set and add to all two hop neighbours

Node's routing table

Set Route=True

End…

IV.Conclusion

We have proposed a Rate based congestion control mechanism for heterogeneous data for Dynamic environment. Network characteristics like congestion and route failure need to be detected and remedied with a reliable mechanism. To solve the congestion problem, we have proposed a dynamic congestion estimation technique that could analyze the traffic fluctuation. By having early detection of the buffer, we can initiate the process of the feedback to control the congestion. This scheme is better as compare to the waiting for congestion to happen and then to take corrective action. We have included the priority bit along with the congestion notification bit. This will aid the conveyance of the CRP packet to reach up to the neighbouring nodes. After simulating the algorithm, we are going to compare the expected results to the simulated results.

References

[1] Braden, B., Clark, D., Crow croft, J., Davie, B., Eering, S., Estrin, D., Floyd, S., Jacobson, V.,Minshall, G., Partridge, C., Peterson, L., Ramakrishna, K., Shenker, S., Wroclaw ski, J., Zhang, L.,1998. Recommendations on queue management and congestion avoidance in the internet. RFC 2309, IETF.

[2] Senthilkumaran, T., Sankaranarayanan, V., 2010. Early detection congestion and control routing in MANET, In: Proceedings of the Seventh IEEE and IFIP International Conference on Wireless and Optical Communications Networks (WOCN 2010), Srilanka, pp. 1–5.
[3] Senthilkumaran, T., Sankaranarayanan, V., 2011b. Early congestion detection and optimal control routing in MANET. European Journal of Scientific Research 63 (1), 15–31.
[4] Research on Traffic Monitoring Network and its Traffic Flow Forecast and Congestion Control Model Based on Wireless Sensor Networks. Xiao Laisheng, Peng Xiaohong College of Information Technology Guangdong Ocean University Zhanjiang, P.R. China Wang Zhengxia College of Law Guangdong Ocean University Zhanjiang, P.R. China 2009 International Conference.
[5] Research on Traffic Monitoring Network and its Traffic Flow Forecast and Congestion Control Model Based on Wireless Sensor Networks. Xiao Laisheng, Peng Xiaohong College of Information Technology Guangdong Ocean University Zhanjiang, P.R. China Wang Zhengxia College of Law Guangdong Ocean University Zhanjiang, P.R. China 2009 International Conference.
[6] Chieh-Yih Wan, Shane B. Eisenman and Andrew T. Cambell, "CODA: Congestion Detection and Avoidance in Sensor", in Proc. of ACM SenSys"03.
[7] Computer network, S.Tanenbaum, fourth edition, Pearson education.
[8] D.Comer, Internetworking with TCP/IP: Principles, Protocols, and Architecture, Prentice Hall, 2006.

Authors' Biography

K.Rangaswamy is currently an Assistant Professor of Computer Science and Engineering at Chaitanya Bharathi Institute of Technology Proddatur, Andrapradesh.His most focus on networks. He received M.Tech degree in Computer Science at Bharath University, Chennai in 2011, his B.Tech degree in Computer Science and Engineering from JNTUA Anatapuramu in 2009.

Prof. Pandurangan Ravi has an experience of about 20 years in Teaching and as well as various Administrative positions at different organizations. After obtaining his undergraduate, Post Graduate and Doctoral Degree, he is now concentrating in the area of Computer Networks. He has published 8 Research Papers in International Journals and 4 in National and International Conferences. He is recipient of international Kohinoor Award for Educational Excellence" for the year 2010. He received the award "Mother Theresa Educational Excellence Award-2012" and also he received "International Researcher" for the year 2013 from IAMURE, Indonesia. He is life member of 'Indian Society for Technical Education' and he is on editorial board for four International Journals.

Y. Subba Reddy is Associate professor and Head, Department of computer Science & Engineering in Chaitanya Bharathi Institute of Technology Proddatur, AP India. He holds an M.E (CSE) Satyabhama University, Chennai, T.N, India and Pursuing Ph.D (Computer Science) from S.V.University, Tirupati, Andhra Pradesh, India. He has around 15 years of Teaching and research experience. His research interests are Internet Voting System, Data mining, Neural Networks and Quantum cryptography. He is an active member of CSI.

Y.Sreedhar is currently an Assistant Professor of Computer Science and Engineering at Chaitanya Bharathi Institute of Technology Proddatur, Andrapradesh. Pursuing Ph.D in (Computer Science) from K.L.University, Andhra Pradesh, India. He received M.Tech degree in Computer Science from Jawaharlal Nehru Technological University, Hyderabad, his B.Tech degree is in Computer Science from Jawaharlal Nehru Technological University, Hyderabad. His research interest is value based software engineering.