ISSN:0975-9646

S.Priyadharshini et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 3 (1) , 2012, 3142 - 3143

# Counter Measure for Congestion in TCP/IP using Bandwidth Estimation

S.Priyadharshini,J.Sathya Priya,
*Department of IT, Velammal Engineering College,Chennai*

**Abstract The main reason for network congestion is using TCP/IP protocol for transmission. In this paper, the technique called bandwidth estimation is used to avoid congestion in the network which uses TCP/IP protocol mechanism. It finds out the equilibrium point of the window and then the size of the window is adjusted in a round trip time. Initially the TCP and Active Queue Management technique is discussed on congestion avoidance. Then with the bandwidth estimation technique congestion control is achieved, and it is proved to be better than TCP Vegas both in the homogeneous and heterogeneous systems.**

**Keywords Bandwidth estimation technique,round trip time, active queue management**

## 1 INTRODUCTION

Present technologies for improving TCP are 1. Timeout mechanism, which avoids congestion by controlling the total number of extra buffers that the network has. 2. Modified slow start technique. Various experiments prove that Vegas which is the existing system are able to get only 37 to 70% of throughput when compared to the TCP network. So there is a need to perform changes to the implementation of TCP.

TCP is a connection-oriented protocol that is introduced to provide a reliable transmission policy in an unreliable network, which may vary due to different users, routers, bandwidths. Now, the focus is on the router, which will play a vital role in delivering packets from the source links to the destination links rather than the source system. The traditional, simplest, and most effective queuing method implemented at the router is so-called Drop- Tail, which drops the packet only when the buffer is full. Recently, AQM (Active Queue Management) has become the important topic in this area.

## 2 CONGESTION CONTROL:

TCP congestion control, called “Bandwidth based TCP”, differs from most TCP algorithms. The reason is by using the bandwidth estimation as the congestion measure the window size increment is controlled. The equilibrium point of window size is predicted in a round-trip-time. Furthermore, an approach based on TCP Westwood is also developed to deal with the congestion problem. Different operating systems and other devices are available with the proposed scheme, thus one can conclude that the environment is heterogeneous. Some control theories are quoted here to find out the equilibrium points where the state variables will be in steady state first, and then, linearization is used to deal with such a nonlinear system, and finally, stability can be examined by inspecting the small neighborhood of these equilibrium points. At last it is demonstrated the proposed work has some advantages over TCP-Vegas.

## 3 CONGESTIVE COLLAPSE:

Congestive collapse (or congestion collapse) is a condition which a packet switched computer network can reach, when little or no useful communication is happening due to congestion. Congestion collapse generally occurs at choke points in the network, where the total incoming bandwidth to a node exceeds the outgoing bandwidth. Connection points between a local area network and a wide area network are the most likely choke points. A DSL modem is the most common small network example, with between 10 and 1000 Mbit/s of incoming bandwidth and at most 8 Mbit/s of outgoing bandwidth.

When a network is in such a condition, it has settled (under overload) into a stable state where traffic demand is high but little useful throughput is available, and there are high levels of packet delay and loss (caused by routers discarding packets because their output queues are too full) and general quality of service is extremely poor.

Congestion collapse was identified as a possible problem. when the NSFnet phase-I backbone dropped three orders of magnitude from its capacity of 32 kbit/s to 40 bit/s, and this continued to occur until end nodes started implementing Van Jacobson's congestion control .

When more packets were sent than could be handled by intermediate routers, the intermediate routers discarded many packets, expecting the end points of the network to retransmit the information. However, early TCP implementations had very bad retransmission behavior. When this packet loss occurred, the end points sent extra packets that repeated the information lost; doubling the data rate sent, exactly the opposite of what should be done during congestion. This pushed the entire network into a 'congestion collapse' where most packets were lost and the resultant throughput was negligible.

## 4 ROUND TRIP TIME:

TCP Vegas uses the round-trip-time (RTT) information to vary the adjustment. The following subsections provide a quick overview of these three TCPs. TCP-Vegas uses three techniques to achieve a higher throughput but lower losses than TCP-Reno.

These modifications are summarized as follows:

1. Retransmission Mechanism—more accurate RTT estimation is used to retransmit a dropped segment.

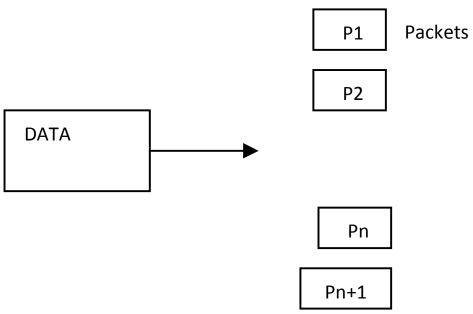
2. Congestion Avoidance Mechanism—controls the amount of extra data, and then adjusts its transmission rate accordingly.
3. Once the first acknowledgment is received, the sender calculates the RTT and takes this value as a reference value, called RTTmin.

## 5 BANDWIDTH ESTIMATION:

Here, a defect of TCP-Vegas that has been identified is rectified. The model called bandwidth-based TCP is developed to adjust window size according to the estimated bandwidth. The one-sender configuration is given to show the key behavior of the proposed algorithm. The benefit of bandwidth-based TCP is, adjusting the congestion window becomes independent of the external threshold settings. The bandwidth-based approach in TCP congestion control is used. It has three features: modified slow-start, bandwidth estimation, and bandwidth- based adjustment.

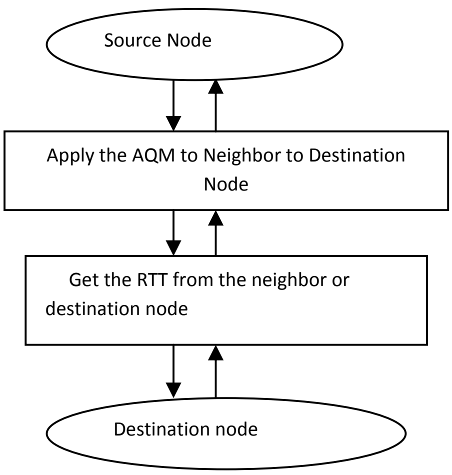
## 6 IMPLEMENTATION

6.1First process



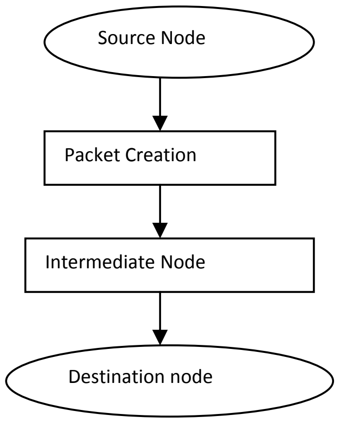

In the implementation totally three processes are performed. In the first process the data from one node is transferred to other nodes in discrete chunks called packets. These packets are named as p1,p2,….pn,pn+1.

6.2Second Process




Once the data are transmitted in terms of packets the source node apply the AQM technique to the adjacent node and it gets the round trip time from the neighbor node or from the destination node. Afterwards the bandwidth is estimated which depends on the adjacent node or the destination node.

6.3Third process




During the third process the source node creates the packet and sends to the intermediate node and then finally to the destination node.

## 7 CONCLUSION

In this paper, the bandwidth-estimation technique is used in TCP congestion control. It has three features: modified slow-start, bandwidth estimation, and bandwidth- based adjustment. In brief, it finds out an equilibrium point of window size then the bandwidth is measured in every round-trip-time. The proposed scheme is shown to have better performance than Vegas under a homogeneous and a heterogeneous environment. Still there are some problems such as the issues in steady state behavior, which will be tackled in the future.

## REFERENCES

1 Chen, J. R., Chen, Y. C., and Lee, C. L., 2000, “TCP Vegas-A: Improving the Performance of TCP Vegas,” Computer Communications, Vol. 23, No 16, pp. 1537-1547.
2. Gerla, M., Sanadidi, M. Y., Wang, Ren, Zanella, A., Casetti, C., and Mascolo, S., 2001, “TCP West- wood: congestion window control using band- width estimation,” IEEE GLOBECOM ’01, Vol. 3, pp. 1698-1702.
3 Hollot, C. V., Misra, V., Towsley, D., and Gong, W. B., 2001, “On Designing Improved Controllers for AQM Routers Supporting TCP Flows,” in Proceedings of IEEE INFOCOM, Vol. 3, pp. 1726-1734, Alaska, USA.
4 Hollot, C. V., and Chait, Y., 2001, “Nonlinear Stabil- ity Analysis for a Class of TCP/AQM Networks,” in Proceedings of IEEE CDC, Vol. 3, pp. 2309- 2314, Orlando, FL, USA.
5 Srijith, K. N., Jacob, L., and Ananda, A. L., 2005, “An End-to-End Flow Control Approach Based on Round Trip Time,” Computer Communications, Vol. 28, No. 4, pp. 429-440.