Adaption of Proactive Measure for Improving Performance Throughput Of TCP-Vegas

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***Abstract*— TCP (Transmission Control Protocol) throughput considered to be one of the most important aspects for analyzing the performance of TCP. This article represents a novel proactive technique based Acknowledge Delay which aims to find out the available bottleneck link before it gets congested to get rid of entering in to Congestion phase. The paper also results the comparison graph of TCP-Vegas, New-Reno and TCP-Enhanced Vegas done on the NS-2.**

Keywords-E-Vegas,NS-2(Network Simulator)

I. INTRODUCTION

TCP in the running age required being as fast and as much possible as free of congestion, the most important feature to be concerned is the throughput it attains during communication over media. Throughput is defined as the number of successful packets delivered per unit time. Various versions of TCP like TCP-Yeah [3], TCP-Hybla [4] are derived with the aim to achieve high throughput to make communication faster. Slow start phase and the recovery phase it get enter in to the congestion due to packet loss or high traffic over the link are the most important phases which play a big role in contributing throughput. The TCP versions like TCP Tahoe, Reno, and New Reno follow the algorithm which are reactive ones i.e., they attempts to recover the bottleneck bandwidth utilization where as on the other hand TCP-Vegas [5] follows a proactive method to overcome from the problem of Congestion, This algorithm trains the Sender side transmitter to vary the rate of dumping the packet in to the link. So that it can avoid entering in to the Congestion. This paper proposes a delay based method of early detecting the Congestion on the basis of ACK (Acknowledgment) received at the Sender end. Thus it also advices a different technique of Slow Starts and thus helps in attaining much high throughput as compared to the available New Reno and Vegas. The simulator used to compare the TCP clones is NS-2. This paper represents the throughput comparison of New Reno, Vegas and E-Vegas which is based on the technique applied based on early detection of Bandwidth.

A. New Reno

All the TCP clones basically rely over two most important phase's i.e. Slow start phase and congestion avoidance phase New Reno source begins transmitting a new data flow in slow start. The initial congestion window is typically one segment. Each time a New Reno source receives an acknowledgment (ACK) packet, it increases the congestion window cwnd by one segment. With this approach, the congestion window size expands multiplicatively, doubling every RTT. After reaching to the threshold value New Reno enters in to the congestion avoidance phase and to overcome this fault it resets its congestion window to half of the ssthresh(Slow Start Threshold) value and then it increases its cwnd size by one each RTT, which results in degrading the performance and utilization of Link. New Reno follows the following equation to resolve congestion avoidance phase.

B. Vegas

Vegas adds a intelligent scheme to increase the performance of parameters like throughput and cwnd, as it tries to outburst the initial phase of connection, in spite of increasing the window size to one it overshoots the band width capacity and tries to attain the ssthresh value as early as possible. It implements the following procedure

$$\{diff = (Expected\ Throughput - Actual\ Throughput) * Base\ RTT\} \qquad (1)$$

Where "diff" mentioned in equation "1" is additional packets calculated by TCP Vegas, Expected Throughput is the expected throughput, Actual Throughput is the actual observed throughput, and Base RTT is the minimum RTT observed for the network path. The Expected Throughput and Actual Throughput are calculated using the following formula:

$$\text{Expected Throughput} = \frac{Congestion\ window}{Base\ RTT} \qquad (2)$$

$$\text{Actual Throughput} = \frac{cwnd}{RTT} \qquad (3)$$

$$Cwnd(t + t_A) = \begin{cases} cwnd + 1 & if\ diff < \frac{\propto}{base_{rtt}} \\ cwnd & if\ \frac{\propto}{baes_{rtt}} \le diff \le \frac{\beta}{base_{rtt}} \\ cwnd - 1 & if\ \frac{\beta}{base_{rtt}} < diff \end{cases} \qquad (4)$$

$$diff = \frac{cwnd(t)}{base\_rtt} - \frac{cwnd(t)}{rtt} \quad (5)$$

II. PROPOSED METHODOLOGY

E-Vegas

E-Vegas presented in this paper works on the principle of early detecting the bandwidth taking the delay factor of ACK's as the main variable based on which calculating the amount of data to be transmitted so that to make connection not enter in to the congestion phase.

$$diff = \frac{d_k}{t_k - t_k - 1} \qquad (6)$$

In the Equation"6" t_k is the source time at which the amount of data d_k is received andt_{k-1}denotes the time of previous ACK. The capacity or bandwidth of a path means the maximum bandwidth that a flow can achieve when no other traffic is present. Available bandwidth means the maximum bandwidth that such a path can provide to flows, given the existing traffic it is already carrying. The equation demonstrated above tends to modify the Vegas whose adoption makes it to fully utilize the link without entering in to the congestion. The throughput calculation of the TCP is taken as under:

III. EXPERIMENT AND RESULTS

This paper contains the simulation results of TCP clones taken for evaluation with constant configuration parameters and constant simulation scenario. TCP New Reno, Vegas and M-Vegas results with their throughput and cwnd behavior are presented in the following section. Which entails that taking proactive measure is best policy to adopt to avoid congestion rather than to react it. The simulation result also proofs that throughput and cwnd behaves well in TCP E-Vegas

A. Experimental Set up

The well known dumbbell topology is taken in to account for simulation the following are configuration of experimental set up depicted in the Table.1

Network Parameter	Values
Bandwidth	50Mbps
Packet Size	1000
Simulation	30 sec

Table.1

B. Simulation Set up & Results

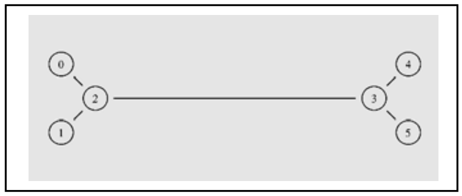

Fig.1

Fig.1 shows the simulation topology where node 'O' & node '1' are the source node and node'4' &node '5' are the destination nodes, node '2' & node '3' are the Drop tail queue serving as the bottleneck link between the source and destination node.

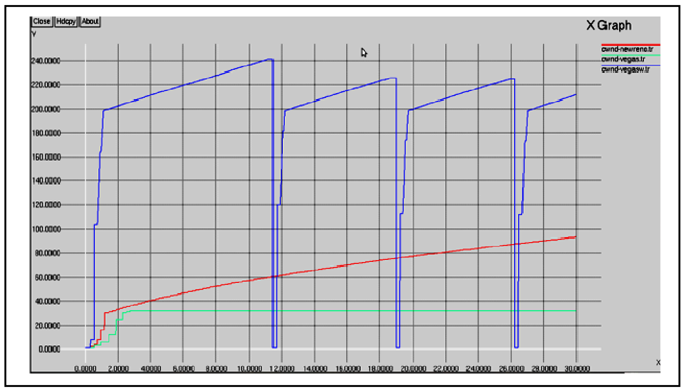

Fig.2

Figure.2 above demonstrates the comparison graph of Congestion Window of TCP New Reno Vegas and TCP E-Vegas.

IV. CONCLUSION

The technique derived in this article based on a new delay based bandwidth estimation technique, represents a hopeful improvement in the congestion avoidance phase which can be further deployed over to some different networking scenarios to find out other parametrical aspects of TCP-Vegas to bring out some more efficient transmission. As the need in coming days is to make congestion free link to make communication as faster and as efficient possible, so the future work recommended is to improve the throughput of the link with respect to each TCP connection over the link by amending improvements in Congestion avoidance phase.

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