



A High Performance and Efficient TCP Variant

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Abstract

With emergence of the latest technology and deployment of wireless mobile networks for data communication services, the need of the people has also been increased. There has been a significant effort to tune TCP for these networks. The performance of TCP is affected due to several factors including the congestion window, maximum packet size; retry limit, recovery mechanism, backup mechanism and mobility. The proposed TCP variants are successful in fixed networks but did not yield good results in a mobile / wireless network. In this Work, we propose a new TCP variant named UB by integrating the features of TCP Westwood and Vegas. TCP-UB provides better performance than the other TCP variants from the mobility point of view. We have simulated our algorithm using NS2.28 which shows that TCP-UB achieves superior performance over TCP Vegas and Westwood.

INTRODUCTION

The use of wireless networks in this century has motivated many researchers to study and make exertion for modifying TCP, which was originally designed for fixed wired networks. The result of those efforts shows that TCP in its current structure is not an optimal transport service for mobile and wireless networks. However, TCP can perform very well with these networks by improving the congestion mechanism of the existing TCP variants. In this work, we propose a new TCP variant by integrating the important features of TCP Vegas and Westwood to provide better performance from both the efficiency and mobility point of views.

PROPOSED ALGORITHM

This algorithm works as given below:
 If (the Dup ACKs are arrived) then
 {
 Let Base RTT is the minimum of all RTTs;
 Expected Rate= CWND /Base RTT;
 Actual Rate= CWND/RTT;
 Diff = (Expected Rate – Actual Rate) BaseRTT;
 If (Diff < α) then
 CWND+1;
 Else
 If (Diff=δ) then
 {
 Let ssthresh = (BWE*BaseRTT)/seg_size;
 If (CWND > ssthresh) then
 CWND=ssthresh;
 }
 Else
 If (the time out is expired) then
 {
 Let CWND=1;
 ssthresh = (BWE*BaseRTT)/seg_size;
 If (ssthresh<2) then
 Ssthresh=2;
 }
 Else
 If (Diff > β) then
 CWND-1;
 Otherwise -> CWND;
 };

SIMULATION SET UP

Maximum Speed = 35 and Minimum =0.
 Number of Nodes= 100 Mobile Nodes.
 Traffic Type: FTP& CBR.
 Number of Packets= 8 packets/ sec.
 Pause Time = 10 milli seconds.
 Simulation Area= 1000 *1000 squares meters.
 Packet Size = 1040 bytes.
 Packet Rate= 10 packets/ sec.
 Queue Length= 80.
 Simulator = ns2.28.
 Pause Time = 5 seconds.
 Simulation Time= 140 seconds.
 Mobility model= RWM(Random Waypoint Model)
 Transmission Range = 250 meter.
 Antenna Type= Omni directional.

SIMULATION RESULTS AND ANALYSIS

A. Efficiency Variance Scenario

we have simulated our network over MANET and wireless segments with NS2 and examined the efficiency of TCP Westwood, TCP Vegas and TCP-UB. For each of above TCP variants, we have collected their acknowledged and received packets. Figure 1 shows the efficiency of TCP Vegas which steadily decreases for acknowledged packets from 5.8Mb to 4.2Mb over the time. In figure 2 we can notice that the efficiency of TCP Westwood decreases with almost the same numbers. The reason for this decreasing of packet's efficiency is the mobility.

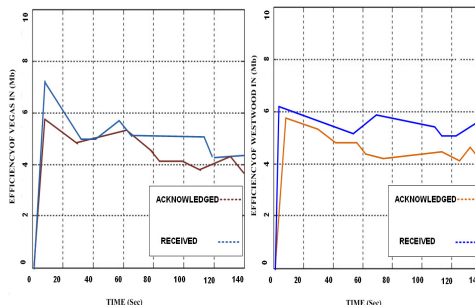


Figure 1: show the efficacy of TCP-Vegas

Figure 2: show the efficacy of TCP-Westwood

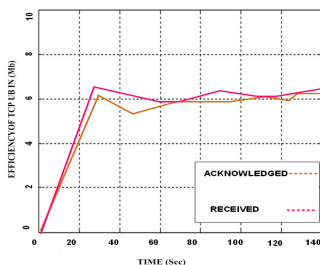


Figure3:show the efficacy of TCP-UB

On the basis of efficiency, it is clear that TCP-UB acknowledges more packets than TCP Vegas and TCP Westwood as shown in Figure 3.

An important feature of TCP-UB is the stability.

B. GoodPut Scenario

We show average of GoodPut for TCP variants. From static and mobility point of view as are shown in figure (4, 5). TCP Vegas and Westwood are not stable if the speed increases from 25 to 35m/sec. They show poor performance while TCP-UB the most stable performance throughout changes in nodes' speed. Important factor is using Gama for division of congestion avoidance phase into three parts. The partition of congestion avoidance phase provides sufficient time to control congestion window and loss of packets. The behavior of routing protocols also cannot affect Good put performance of TCP-UB.

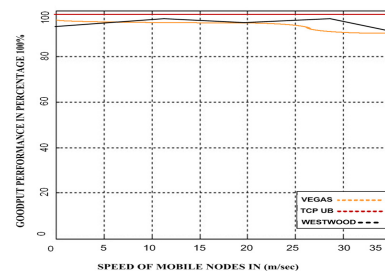


Figure 4: Mobility scenario of GoodPut

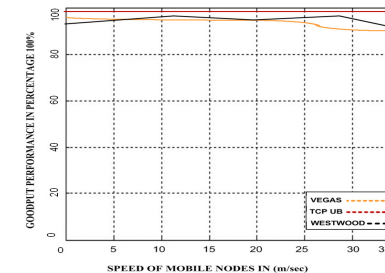


Figure 5: Static Scenario of GoodPut

CONCLUSION

Results show that TCP-UB is not sensitive to mobility, is highly efficient and achieves higher delivery of data as compared to TCP Vegas and TCP Westwood. Furthermore, TCP-UB has achieved excellent performance based on the results we validated and measured over all the conditions and scenarios.