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IMPACT ON PERFORMANCE OF TCP RENO BASED ON BANDWIDTH UTILISATION

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ABSTRACT:

This article analyzes the mechanisms of TCP Reno and TCP Veno algorithm with its existing problems, the reasons of packet transmission loss cannot be distinguished accurately, and we propose a comparison of TCP Reno with Veno in order to distinguish the cause of the transmission loss more accurately, and achieve higher network resources utilization .In order to control the congestion and to reduce the packet loss we use Veno algorithm and to achieve high throughput and user friendliness even in the case of high packet loss.

INTRODUCTION:

The wireless network has the advantages of easy and fast development and outstanding mobile performance [1], but it usually has these characteristics such as high error rates, low bandwidth, large delay and high mobile switching frequency, which makes the reliability of the wireless links relatively poor [2]. And it only requires a simple retransmission of lost data. Various type of loss occurs in transport layer. Congestion control is the main issues in the transport layer However; the traditional TCP protocol cannot distinguish the reasons for the loss of data transmission [3]. After finding the data transmission loss, it will unquestioningly start the congestion control and reduce the transmission rate, which causes seriously performance dropping [4]. Therefore, improving the TCP protocol and its performance is the main issue in transport layer [5].There are four wireless network TCP improvement schemes: data link layer scheme, cross-layer cooperation scheme, segmented connectivity scheme and end-to- end transport layer scheme [6]. The end-to-end transport layer scheme is more preferred [7]. It modified TCP itself to adapt it to the characteristics of the wireless network environment, and avoid complicating matters due to the change of other layers or intermediate router, which makes it easy to carry out with better deployment[8]. The end-to-end transport layer scheme mainly includes TCP Probing, TCP Real, TCP Peach, TCP Veno, TCP HACK, TCP Santa Cruz, TCP Westwood, TCP Jersey, TCP Pacing, TCP smart-Framing, TCP SACK, SMART Retransmission and so on[9].

The main idea is that after sending end detects of packet loss, it enters the detection stage. The length of time associates with the wireless channel conditions. TCP Westwood is an end- to-end congestion control algorithm based on transmission rate [10]. The sending end measures and calculates the rate of return ACK packets to dynamically estimate the available network bandwidth [11]. TCP SACK adds SACK option to record the received packets information which arrived out of sequence to the ACK header. According to SACK option in the ACK, the sending end selectively retransmits lost packets to restore loss packets in a TCP sending window. If data loss has been detected and current connection is in the congestion state, Veno algorithm will make the judgment that the data transmission loss is caused by network congestion [12]. Otherwise,

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the data transmission loss is caused by wireless link random error. However, TCP Veno algorithm still has the problems of low link utilization under light load wireless network environment, and misjudging the packets loss causes under heavy load wireless network environment.

ANALYSIS OF VENO AND RENO ALGORITHM PROBLEMS

The Mechanism of Congestion State Division Veno algorithm utilizes the mechanism similar to Vegas algorithm to estimate the current network connection status. It utilizes the estimations obtained from the previous marked completion of the RTT calculation to predict the current RTT network congestion state. The sending end continuously measures Expected and Actual.

Expected= cwnd / BaseRTT (1)

Actual = cwnd / RTT (2)

RTT = v sumRTT / v cntRTT (3)

DifJ = Expected -Actual (4)

RTT = BaseRTT + N / Actual (5)

N = Actual* (RTT -BaseRT1) = DifJ* BaseRTT (6)

Among them, cwnd is the current TCP congestion window. BaseRTT is the minimum circuit round trip time. RTT is measured value of the circuit round trip time after smoothing process. After each data packet and its ACK are received, Veno algorithm will record RTT, and add it to the v_ sumRTT. When the received ACK sequence number is larger than that of the marked data packet, it indicates the end of marked RTT. Then the next round of calculations starts, and vJntRTT plus 1. To conclude, Veno algorithm has the following problems: When the network load is low, the data transfer loss is mainly caused by random errors of the wireless linleVeno algorithm frequently reduces cwnd by one-fifth, which still can not make cwnd reach a reasonable higher value, resulting in low network resource utilization. When the network load is high, Veno algorithm may misjudge the causes of data transmission loss.

IDENTIFICATION OF CONGESTION LEVEL

Veno algorithm refines the network status based on Reno algorithm to adjust the network more accurately. Veno algorithm sets two threshold value: a = 2, β= 4.

a) When N <= α, congestion does not occur. Packets loss are regarded as caused by random errors during wireless link transmission, and ssthresh = cwnd.

b) When α < =β, it is mild congestion. Packets loss are regarded as caused by random errors during wireless link transmission and network congestion packet loss, and ssthresh = ewnd * div.

c) When N> β, it is severe congestion. Packets loss are regarded as mainly caused by network congestion, and ssthresh = ewnd/2.

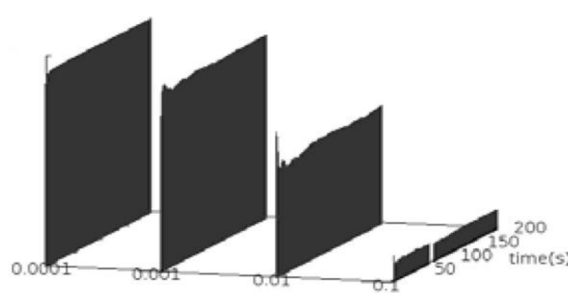
SIMULATIONS OF VENO ALGORITHM

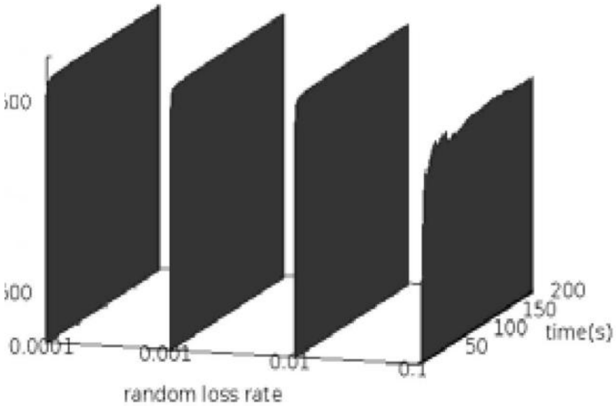
NS2 network simulator is used for comparing with Reno and Veno's performances.

A.SIMULATIONS OF A SINGLE DATA FLOW IN SINGLE LINK

Under light load conditions of the wireless network, packet loss rates of wireless links play a decisive role on the network throughput. The sender sends FTP data stream of TCP to the receiver from 0 to 200 seconds. The packet loss rates of the link between router B and the receiving end are respectively set as 10-1, 10-2, 10-3 and 10-4. The sender respectively uses Reno algorithm, Veno algorithm, and algorithm to send data. The router uses Drop Tail queue management algorithm

(A) The average throughput of Reno algorithm





(B) The average throughput of Veno algorithm

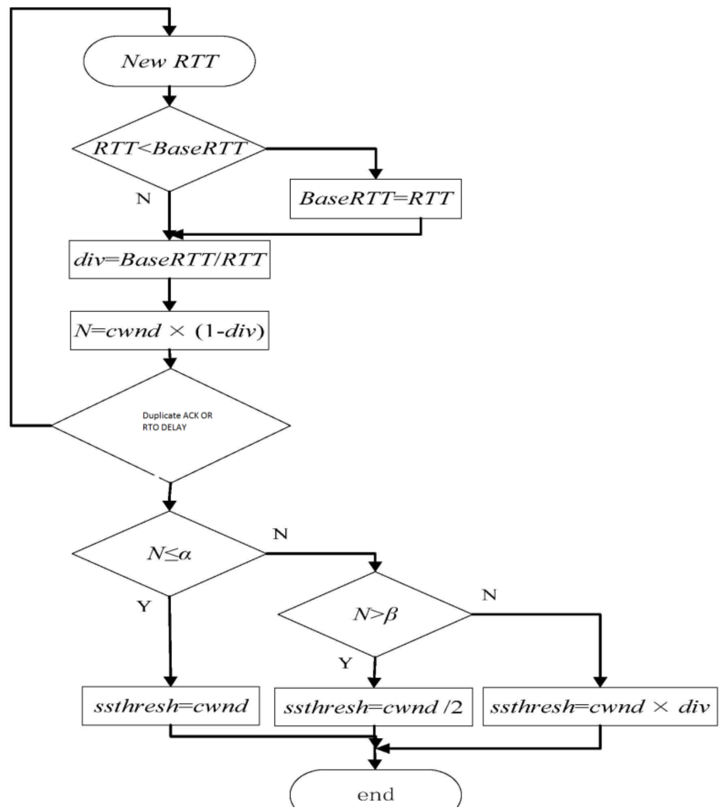
Fig.6. Relationship of average throughputs and packet loss rates for three algorithms

When the packet loss rates are very small (0.0001, 0.001), throughputs of the three algorithms all remain at a higher value. When the packet loss rates are higher (0.01, 0.1), throughputs of veno algorithm remain at a higher level. Veno algorithm can effectively distinguish the reason of the loss of data transmission, consequently maintaining a high throughput

The experiment uses UDP as the background data streams, to compete with TCP data streams for bandwidth, which creates the bottleneck link congestion to inspect Veno algorithm performance under heavy load conditions of network. Experiments with Veno algorithm and Reno algorithm have been conducted: S1sends IMbps of UDP data to D1 in 0 to 10 seconds and 20 to 30 seconds. S0 sends TCP data to D0 in 0 to 30 seconds. A change of the congestion windows and the slow start thresholds during simulations are shown in Figure

CONCLUSION

The implementation mechanism and existing problems of Veno and Reno algorithm have been analyzed. In this paper, based on which throughput has been increased in Reno algorithm even if we have more packet loss. Thus better utilization has been made of the network bandwidth. Simulations of Veno algorithm have been conducted in NS-2, and analysis of the obtained data has been provided. Comparing with Reno algorithm and Veno algorithm, Veno algorithm can provide an better outcome by improving throughput and link utilization in wireless network.



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