A novel TCP congestion control scheme using fuzzy set theorem

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ABSTRACT

Currently, TCP is the most popular protocol of transport layer used on Internet. It provides a reliable data transmission between the source and the destination. With the maturation of Internet and the widespread use of the TCP, the efficiency of TCP becomes an important concern. Therefore, many researches for TCP congestion control have been proposed to improve transmission performance. In this paper, we propose a modified the TCP congestion control scheme. The proposed method apply Fuzzy logic control instead of the slow-start/congestion avoidance mechanism to adjust TCP congestion window. Upon receiving each new ACK, the proposed method enable TCP source to adjust the TCP congestion window size effectively. By monitoring the difference between current congestion window and the threshold as well as the queue length of bottleneck link buffer, the proposed method increase or decrease the congestion window to accommodate the changes of network. Simulation results shows that the proposed method has less packet drop, better bottleneck link bandwidth utilization, and better throughput.

Keywords : Fuzzy logic、Congestion control、TCP

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REFERENCES

[1]W. Stevens,“ TCP Slow Start, Congestion Avoidance, Fast Retransmit, and Fast Recovery Algorithms, ” RFC 2001, Jan. 1997.

[2]M. Mathis, J. Mahdavi, S. Floyd, A. Romanow,“ TCP Selective Acknowledgment Options, ” RFC 2018, Oct. 1996.

[3]M. Allman, V. Paxson, W. Stevens,“ TCP Congestion Control, ” RFC 2581, Apr. 1999.

[4]V. Jacobson,“ Congestion Avoidance and Control ”, ACM SIGCOMM 88, pp.273-288, 1988.

[5]V. Jacobson,“ Modified TCP Congestion Avoidance Algorithm ”, mailing list, end2end-interest, 30 Apr. 1990.

[6]S. Floyd and T. Henderson,“ The NewReno Modification to TCP ’ s Fast Recovery Algorithm, ” RFC 2582, Apr. 1999.

[7]H. V. Nejad, M. H. Yaghmaee, H. Tabatabaee, ” FuzzyTCP: Optimizing TCP Congestion Control ”, Communications, APCC '06, 2006.

[8]R. locus, S. Cohler, P, Andreas, and T. Gia,“ Fuzzy Red: Congestion control for TCP/IP Diff-Serv ”, In Proceedings of the 10th Mediterranean Electro technical Conference, 2000.

[9]Gan, Meng, D. Elmar, and S. Jochen,“ Applying computational intelligence for congestion avoidance of high-speed networks ”, In Proceedings of the 7th workshop on future trends of distributed computing systems, 1999.

[10]NS2, http://www.isi.edu/nsnam/ns.

[11]余承樺，“ 改善TCP Vegas效能的遺失重傳演算法 ”，大葉大學資訊工程研究所論文，民國98年。

[12]林泰邑，“ TCP Vegas-AQ:改善TCP Vegas效能的壅塞迴避演算法 ”，大葉大學資訊工程研究所論文，民國96年。

[13]孫宗瀛、楊英魁，“ Fuzzy控制:理論、實作與應用 ”，全華科技圖書館份有限公司，2005年9月。

[14]林信成、彭啟峰，“ OH!Fuzzy 模糊理論剖析 ”，第三波文化事業股份有限公司，1994年8月。