Abstract

Transport Control Protocol (TCP), the mostly used transport protocol, performs well over wired networks. As much as wireless network is deployed, TCP should be modified to work for both wired and wireless networks. Since TCP is designed for congestion control in wired networks, it cannot clearly detect non-congestion related packet loss from wireless networks. TCP Congestion control plays the key role to ensure stability of the Internet along with fair and efficient allocation of the bandwidth. So, congestion control is currently a large area of research and concern in the network community. Many congestion control mechanisms are developed and refined by researcher aiming to overcome congestion. During the last decade, several congestion control mechanisms have been proposed to improve TCP congestion control. Comparing these mechanisms, showing their differences and their improvements, and we identify, classify, and discuss some of these mechanisms of TCP congestion control such as Tahoe, Sack, Reno, NewReno, Vegas, and Westwood. TCP Westwood works for both wired and wireless network, and we propose a new algorithm called TCP WestwoodNew to increase the performance of TCP-Westwood. By enhanced the congestion avoidance of TCP Westwood by a new estimation to cwnd algorithm based on the network status. Also TCP WestwoodNew introduces a new estimation for Retransmission TimeOuts (RTO). RTO has been reported to be a problem on network paths involving links that are prone to sudden delays due to various reasons. Especially many wireless network technologies contain such links. Spurious RTO
often cause unnecessary retransmission of several segments, which is harmful for TCP performance, and unnecessary retransmissions can be avoided. We simulate the proposed algorithm TCP WestwoodNew using the well known network simulator ns-2, by comparing it to the original TCP-Westwood. Simulation results show that the proposed scheme achieves better throughput than TCP Westwood and decreases the delay.

References

- Hsiuyuan Chu, Kuohui Tsai, and Wenjer Chang, "Fuzzy control of active queue
management routers for transmission control protocol networks via time-delay affine
Takagi-Sugeno fuzzy models; International Journal of Innovative Computing, Information
and Control, Volume 4, Number 2, February, 2008.
  - Luigi A. Grieco and Saverio Mascolo, "Performance evaluation and comparison of
Westwood+, New Reno, and Vegas TCP congestion control"; SIGCOMM Computer
997155 http://doi.acm.org/10.1145/997150.997155
  - V. Jacobson and M. J. Karels, "Congestion avoidance and control"; In ACM
Computer Communication Review; Proceedings of the Sigcomm symposium, volume
  - Hanaa A. Torkey, Gamal M. Attiya and I. Z. Morsi, "Performance Evaluation of
End-to-End Congestion Control Protocols"; Menoufia journal of Electronic Engineering
  - Dirceu Cavendish, Kazumi Kumazoe, Masato Tsuru, Yuji Oie, and Mario Gerla,
"CapStart: An Adaptive TCP Slow Start for High Speed Networks"; In Proceedings
of the 2009 First International Conference on Evolving Internet (INTERNET &apos;09). IEEE
Computer Society, Washington, DC, USA, 15-20. DOI=10.1109/INTERNET.2009.10 http://dx.
doi.org/10.1109/INTERNET.2009.10
  - N. Parvez, A. Mahanti, and C. Williamson, "TCP NewReno: Slowbut- Steady or
Impatient?"; IEEE International Communications Conference, ICC &apos;06, vol. 2, June
  - M. Allman, V. Paxson, and W. Stevens. RFC 2581 - TCP Congestion Control. The
  - Hanaa A. Torkey, Gamal M. Attiya and I. Z. Morsi, "Enhanced Fast Recovery
Mechanism for improving TCP NewReno"; Proceedings of the 18th International
Conference on Computer Theory and Applications (ICCTA08), pp. 52-58, Alexandria, Egypt,
October 1988.
  - Beomjoon Kim, Dongmin Kim, and Jaiyong Lee, "Lost Retransmission Detection
for TCP SACK"; IEEE COMMUNICATIONS LETTERS, VOL. 8, NO. 9, September 2004.
ee.lbl.gov/email/vanj.90apr30.txt.
  - L. S. Brakmo and L. L. Peterson, "TCP vegas: End to end congestion avoidance
on a global internet"; IEEE Journal on Selected Areas in Communications,
  - K. N. Srijith, Lillykutty Jacob1, and A. L. Ananda, "TCP Vegas-A: Improving the
  - S. H. Low, L. L. Peterson, and L. Wang, "Understanding TCP Vegas: A Duality
  - L. S. Brakmo, and L. L. Peterson, "TCP Vegas: End to End Congestion
Avoidance on a Global Internet"; IEEE Journal on Selected Areas in Communications, vol.
Enhanced TCP Westwood Congestion Avoidance Mechanism (TCP WestwoodNew)

- Maxim Podlesny and Carey Williamson &quot;Providing Fairness Between TCP NewReno and TCP Vegas with RD Network Services,&quot; Department of Computer Science, University of Calgary, 2010.
- Damon Wischik, Costin Raiciu, Adam Greenhalgh, and Mark Handley, &quot;Design, implementation and evaluation of congestion control for multipath TCP,&quot; In Proceedings of the 8th USENIX conference on Networked systems design and implementation (NSDI’11), USENIX Association, Berkeley, CA, USA, PP. 8-8, 2011.
- Saverio Mascolo and Francesco Vacircay, &quot;The effect of reverse traffic on the performance of new TCP congestion control algorithms,&quot; University of Rome &quot;La Sapienza&quot; 2006.
- Prof. K. Srinivas, Dr. A. A. Chari and N. Kasiviswanath &quot;Updated Congestion Control Algorithm for TCP Throughput improvement in Wired and Wireless Network,&quot; Vol. 9 Issue 5 (Ver. 2. 0), January 2010.
- Nandita Dukkipati, Tiziana Refice and Yuchung Cheng &quot;An Argument for Increasing TCP’s Initial Congestion Window,&quot; Google Inc. 2010.
- ns-2 network simulator (ver. 2). LBL, URL: http://wwwmash.cs.berkeley.edu/ns.

Index Terms

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