

Title: Efficient Data Center in Smart City: Improve Data Center Network Performance

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Abstract

The concept of the smart city is no longer something confined to science fiction. However, fully integrated smart cities will put tremendous strain on existing data infrastructure, especially for data center. From all the data being collected on a regular basis to the intense computing demands of AI-driven machine learning analytics, the sheer amount of traffic and processing workload will force networks to optimize or collapse under their own weight. Furthermore, Internet applications have grown in popularity with the advancement of data center technology. With the increasing demands of many-to-one transmission in data center networks, there will be a lot of packets injected into the switch at the same time competing for the same output port. That may cause the bottleneck buffer overflow and thus many packets must be dropped. Besides, the servers in data center are placed much closer than that in the Internet, so the packet round-trip time is very short. In this situation, if the value of retransmission timeout timer is not set properly, this will make network performance depressed. The problem is called TCP Incast. Hence, in this research, to solve above problem in data centers, the main idea is to dynamically set the threshold values of buffer in a switch. When the number of arriving packets exceeds the first threshold, the switch will (randomly) mark the packets for notify the TCP senders. After the second threshold is exceeded, the switch will (randomly) drop the packets. For achieving the goal of this research, three steps are as follows. First, a threshold setting method should be designed. Then, a new type of TCP mechanism is designed and finally, a new TCP mechanism and a novel threshold setting method in the switch are developed and executed in data centers and the Internet. From simulation results, the performance of the proposed mechanism is better than that of existing mechanism.

Biography

Dr. Cheng-Yuan Ho is an Associate Professor in Department of Computer Science and Information Engineering at Asia University. He received his Bachelor degrees in Mathematics (Major), and Information and Computer Education (Minor) from National Taiwan Normal University in 2003, and the Ph. D. degree in Computer Science from National Chiao Tung University (NCTU) in 2008.

He was a winner of Microsoft Fellowship 2005. In 2006, he was an intern and worked for the Wireless and Networking Group of Microsoft Research Asia, Beijing, China. During this period, he assisted in developing Compound TCP (CTCP), which is embedded in Windows XP, Vista, 7, 8, and 10, Windows Server 2003, 2008, and 2016, and Linux.

He was a postdoctoral researcher of D-Link NCTU Joint Research Center at NCTU from July 2008 to July 2010 and an assistant researcher of Microelectronics and Information Systems Research Center under NCTU's Diamond Program from August 2010 to July 2011. He worked at Advanced Research Institute (ARI) at Institute for Information Industry (III) as a R&D manager from July 2011 to November 2014. He joined LOFTechnology, Inc. as a business operation manager from November 2014 to January 2017.

His main research is focusing on computer networks, network protocols and algorithms, artificial intelligence in applications, big data (especially transportation information analysis), and Internet of Things (IoT).

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