

Paper review ^[1]

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1. The Problem

To make the data center highly available, highly performant computing and storage infrastructure using low cost is the common research goals. While to realize it, the key point is the commodity switches need to handle the traffic of real data center application. The paper just proposed a protocol called data center TCP, which could handle the mix of long and short flows efficiently.

2. Challenge

To realize the demand, there are two main requirements. First is the low latency because the latency directly impacts the quality of result returned and thus revenue and with the low latency the developer could improve the relevance and user experience. Second requirement is to increase the utilization of long flows, which means the system need a high throughput for the long flows.

3. Key Insight

There are two main contribution in the paper.

First, the paper measured and analyzed the production traffic, and pointed out the application patterns of it and found out the relationship between the impairments and the properties of traffic and switches. In detail, the paper first demonstrated the partition/aggregate, which is a common application structure. After that, the paper measured the synchronized and bursty traffic patterns and pointed out the three performance impairments related to these patterns of the structure.

Second, the paper proposed a new protocol called Data Center TCP, which could satisfy the requirement and the DCTCP combined the Explicit Congestion Notification with a novel control scheme at the sources, which allows the DCTCP to operate with low buffer occupancies. In detail, there are three main components in the DCTCP algorithm, which are simple marking at the switch, ECN-Echo at the receivers and the controller at the sender. What's more, the paper also evaluated the performance of the DCTCP in multiple ways.

4. Limitation

The first limitation is the paper does not solve the bandwidth problem between the internal and external flows, which will may be a bottleneck for the its performance. What's more, there is still concern that the on-off style marking will cause the synchronization between flows, even if the paper said this concern is not severe.

5. Future Work

It is possible for the DCTCP to replace the congestion control algorithm in TCP, but it still needs more optimization and more precise analysis on how well it works. What's more, in the paper, the researcher only focused on the data center assumption. And in the future, the DCTCP could be optimized in more orientation such as the properties associated with the wide area networks.

[1] A. Mohammad, J. Adel, P. Balaji(2011). Analysis of DCTCP: Stability, convergence, and fairness *SIGMETRICS 2011, Proceedings of the 2011 ACM SIGMETRICS international Conference on Measurement and Modelling of Computer Systems*.