

# ICTCP: Incast congestion control for TCP in data-center networks

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## Problem:

In data center networks, client requests data from many servers. Therefore, there will be multiple connections from multiple server to one client for data transmission. Incast congestion happens when the buffer of Ethernet switch buffer is overflowed by multiple TCP connections, which causes package loss and TCP time out. If incast congestion happens, the throughput and bandwidth utilization ratio will be very low.

We plan to reimplemented ICTCP algorithm described in [1] to solve the incast congestion problem.

## Method:

The algorithm is based on control of receive window. It builds an ICTCP scheme at the receiver side and use it to control the receive window size. The receive window is adjust before package loss happens, therefore reduce the time out ratio. It uses three rules to control receive window.

1. Using available bandwidth to control receive window. If available bandwidth is lower than threshold, stop increasing receive window.
2. For each connection, the control interval is  $2 \times \text{RTT}$ , since it needs 1 RTT for adjusted window to make effect and 1 additional RTT to measure the throughput of newly adjusted window. Using measured throughput and expected throughput to adjust receive window.
3. To ensure fairness, if available bandwidth is larger than threshold, decrease the receive window of connections whose receive window is larger than average receive window.

## Environment:

[1] uses 47 severs and one Quanta LB4G 48 port Gigabit Ethernet swith to perform the experiment. In order to get the similar environment, we plan to use ns-3 to simulate a data center network and perform over experiment on the simulated network.

## Goal:

Our goal is reimplementing the ICTCP scheme on receive side which can reduce timeout ratio and have high goodput for TCP incast. We will consider to extend the ICTCP in more cases in our further work.

## Reference:

[1] Wu H, Feng Z, Guo C, et al. ICTCP: Incast congestion control for TCP in data-center networks[J]. IEEE/ACM transactions on networking, 2013, 21(2): 345-358.