Identifying and Handling Non-Queue Building Flows in a Bottleneck Link

draft-white-tsvwg-nqb-00

Greg White

TSVWG @ IETF103

November 5, 2018

Inspirations

fq_codel gives strict priority to “sparse” flows

Is there a way to achieve a similar benefit in non–fq systems?

In a dual-queue L4S node, can we identify “sparse” unresponsive traffic that can be carried in the L-queue?

Goals

Reliable (P99) low latency and low loss for “sparse” traffic flows

Allow capacity-seeking applications to compete for bandwidth

Support L4S

Queue-Building vs Non-Queue-Building

- Queue-Building flows
  - Capacity-seeking flows using a traditional congestion controller
  - Highly bursty flows that exceed the link capacity

- Non-Queue-Building
  - Relatively low data rate, not capacity seeking
  - Perhaps latency sensitive (but not necessarily)
  - Highly unlikely to send large bursts that exceed available link capacity
  - Might send short bursts

Dual-Queue Link

- One deep queue (with AQM?) for Queue-Building Flows
- One shallow queue for Non-Queue-Building Flows

- Align with L4S dual-queue coupled AQM approach to support L4S TCP

Identifying NQB flows

- Application/OS self identification
  - Application and/or Operating System are in best position to know sender behavior
  - Standardized packet mark (DSCP) to indicate NQB
- Queuing Behavior Analysis
  - Monitor packet arrivals (per 5-tuple) to determine which flows are QB

Trust but Verify – Marking + Analysis

- Application/endpoint marking - Trustable?
  - No incentive to lie
  - QB flows get better performance in the QB queue
  - NQB flows get better performance in the NQB queue

- But, sometimes bad things happen
  - QB flow entering the NQB queue would cause problems (latency/loss) for other flows

- Queue Protection Function
  - Perform Queue Behavior Analysis only on NQB marked packets
  - Re-direct QB flows to the QB queue

Summary of feedback from the mailing list

- Be more clear on problem statement & requirements
- Don’t point out the downsides of fq_codel unless you want a fight…