Flow Queue PIE: A Hybrid Packet Scheduler and Active Queue Management Algorithm

draft-tahiliani-tsvwg-fq-pie-01

Mohit P. Tahiliani

TSVWG, IETF 122

Overview of the draft

- Combines “flow queuing” and PIE algorithm
  - Similar to how FQ-CoDel combines FQ and CoDel
- The functioning of FQ is similar to RFC 8290
  - Incoming packets are hashed into buckets, each having its own queue
  - Packets are dequeued using a DRR-based packet scheduler
- The functioning of PIE is similar to RFC 8033 with minor modifications
  - Uses timestamps to calculate queue delay
- Implementations of FQ-PIE
  - Linux
    - Supported in multiple Linux distributions
  - FreeBSD (thanks to Grenville Armitage and team!)
  - network simulator - 3 (ns-3)

Status of FQ-PIE

	CoDel	FQ-CoDel	PIE	FQ-PIE
Linux/FreeBSD implementation	Yes	Yes	Yes	Yes
Specification	RFC 8289	RFC 8290	RFC 8033	Not available

Thanks: Michael Welzl, University of Oslo, Norway

Next

Performing experiments with FQ-PIE using the existing implementations

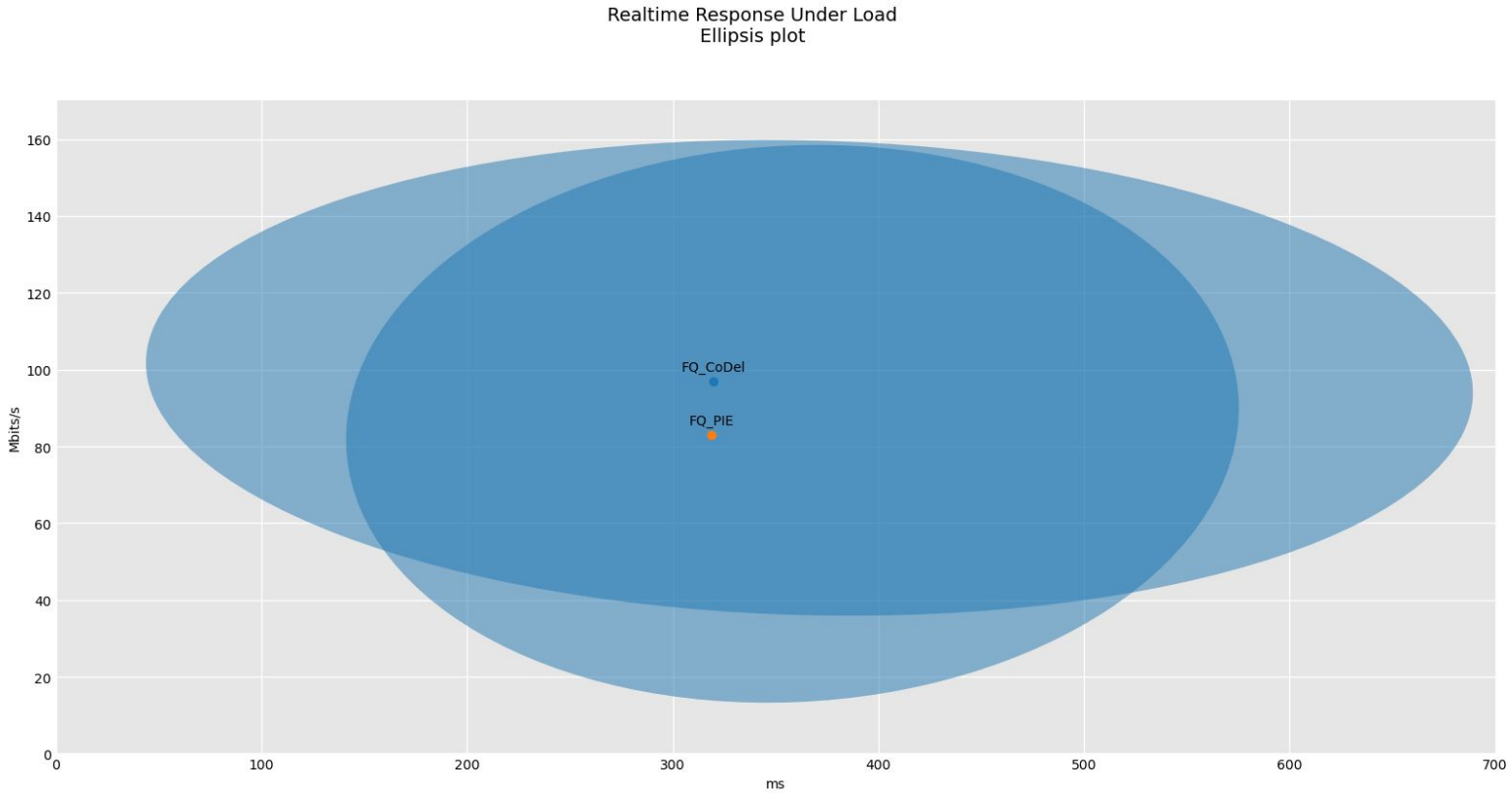
Additional slides

Flexible Network Tester (Flent)

- WiFi APs provided by Quantum Networks for testing: QQ-IW-235 model
  - OpenWrt 23
  - Linux kernel: 5.15.153
  - iproute2: 6.3.0
- Realtime Response Under Load (RRUL)
  - Specifications of this test: https://www.bufferbloat.net/projects/bloat/wiki/RRUL_Spec/
  - Runs RTT measurement using ICMP ping and UDP round trip time measurement
  - Loads up the link with eight TCP streams (four downloads, four uploads)

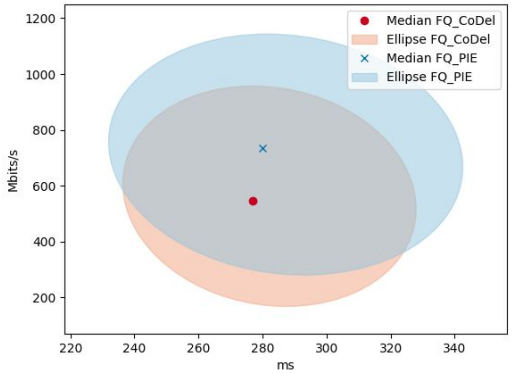
Credits: Vishal Kamath, Rian Pinto, Alen Basil and Smit Rathod

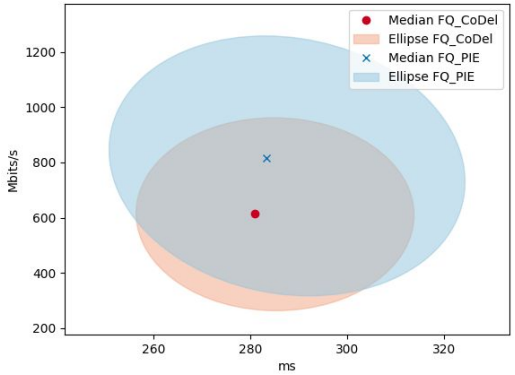
Results from RRUL test



Results from tcp_n down tests

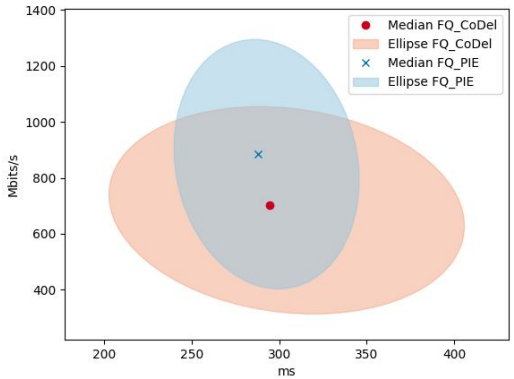
n = 50

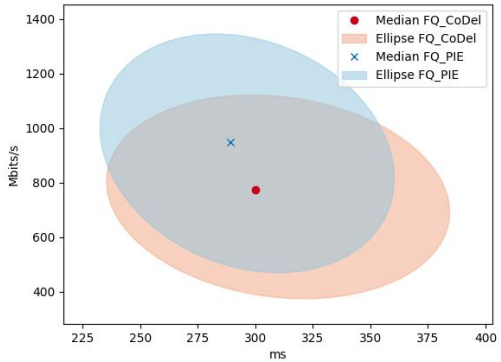




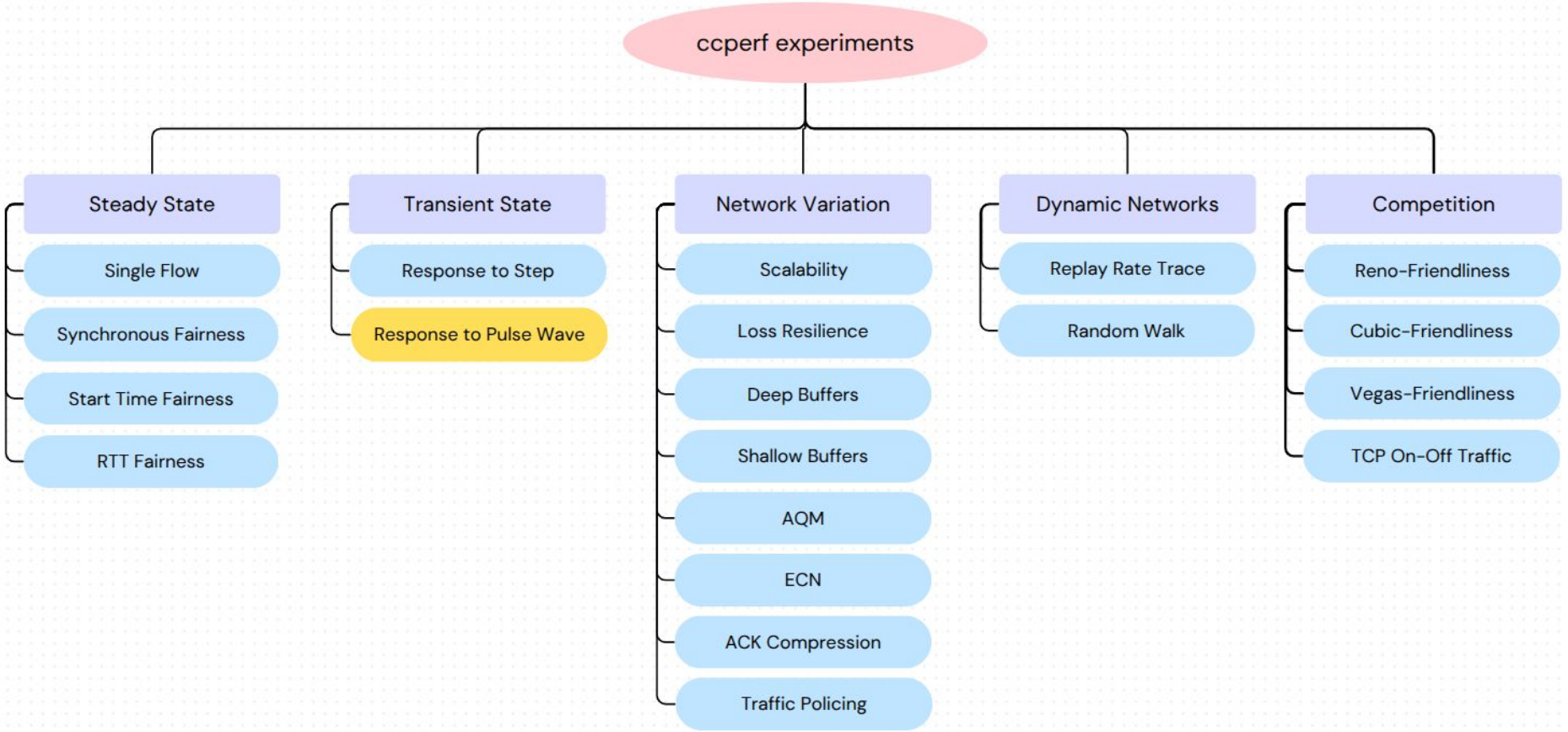
n = 100

n = 200



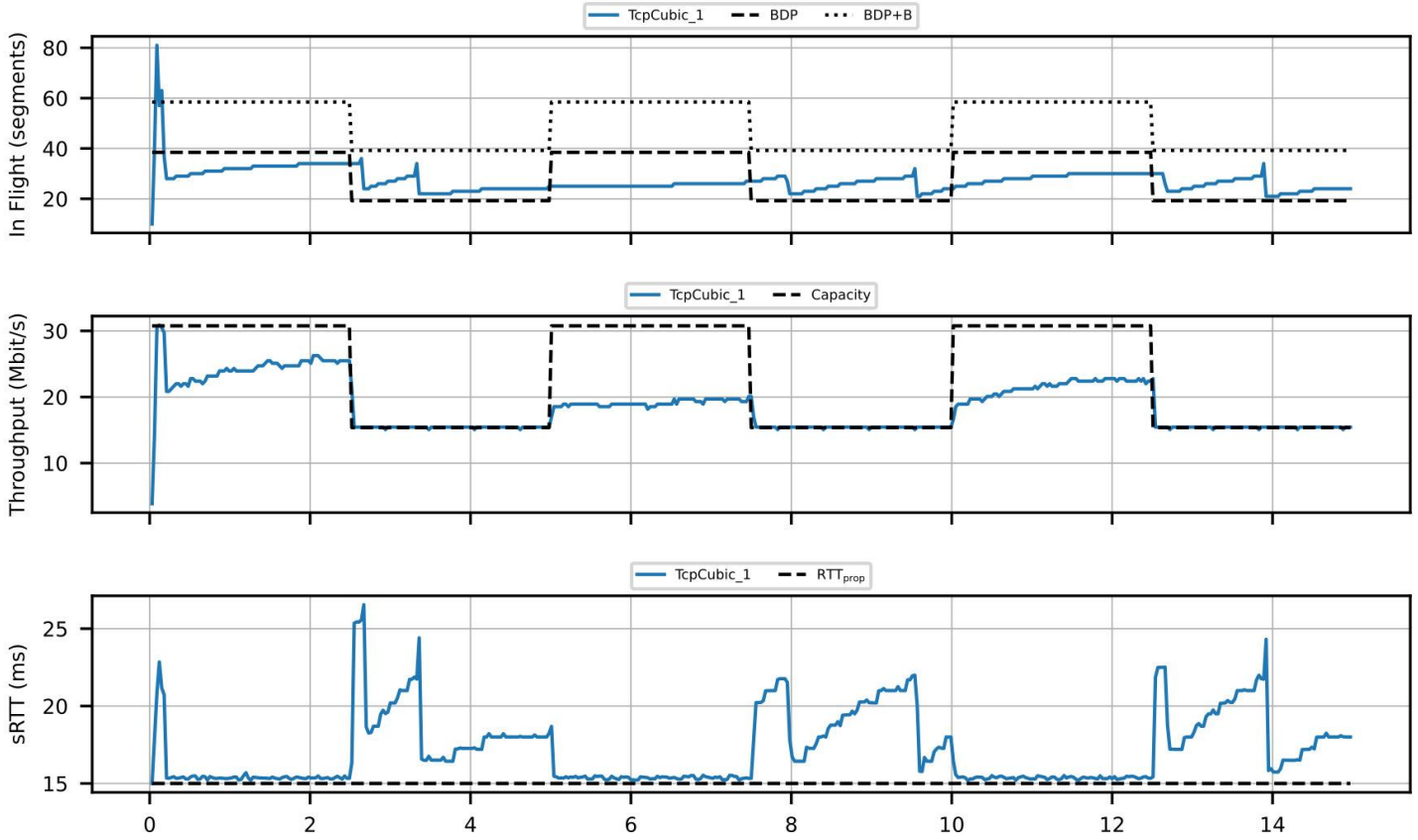
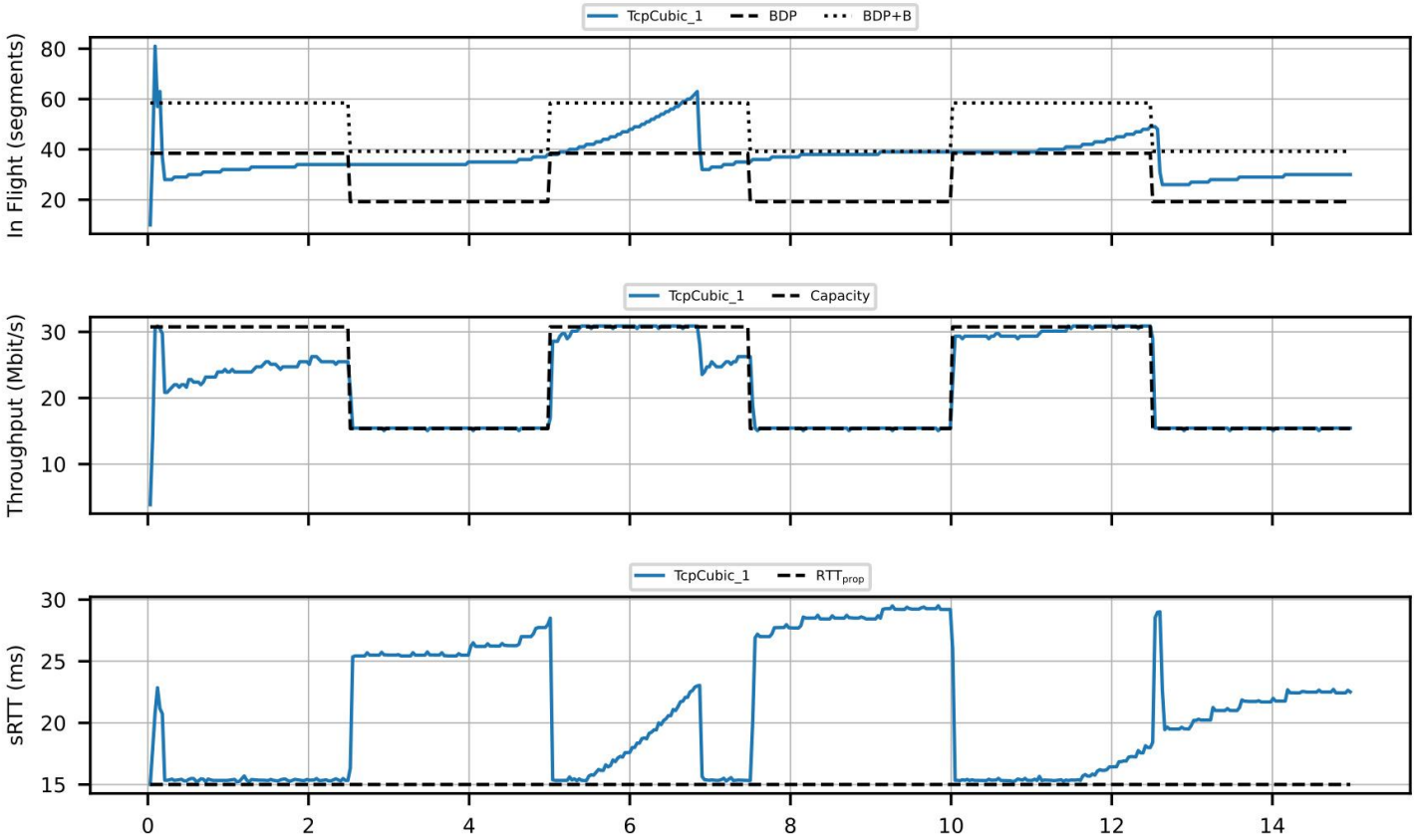


n = 300



Credits: Mahati A. Kalale, Anuhya Murki, Shriya Anil, Rati Preethi S and Y. Supradha Bhat

Response to Pulse wave: FQ-CoDel



Response to Pulse wave: FQ-PIE