IETF Hackathon

IETF 110
ns-3 summary
March 1-4, 2021
Online

Motivation

- Congestion control algorithms continue to be worked on in several IETF/IRTF groups (tsvwg, tcpm, iccrg)
  - ECN-based congestion control is becoming more important, as well as newer algorithms such as BBR
- Testbeds are popular for performance evaluation and offer the most realism to test prototype implementation code
- Network simulation (ns-3) offers some complementary benefits, including accessibility and ability to introduce various wireless (Wi-Fi access, 4G/5G) network models, and reproducibility
  - Validating ns-3 models against testbed experiments is important

Hackathon Plan

- What problems were you working on?
  - ns-3 TCP-related simulation model for TCP Prague
  - AQM models in ns-3 (FQ-PIE, FQ-COBALT, Dual Queue Coupled AQM)
  - ns-3 TCP bug fix validation (confirm SACK operation with PRR)

- What drafts/RFC's were involved?
  - draft-ietf-tsvwg-aqm-dualq-coupled-13 (Dual Queue specification)
  - draft-ietf-tsvwg-ecn-l4s-id-13 (TCP Prague requirements)

- Specific problems to solve
  - Finalize FQ models for PIE (RFC 8033) and COBALT queue discs
  - Update and integrate TCP Prague and Dual Queue models; compare with Linux results

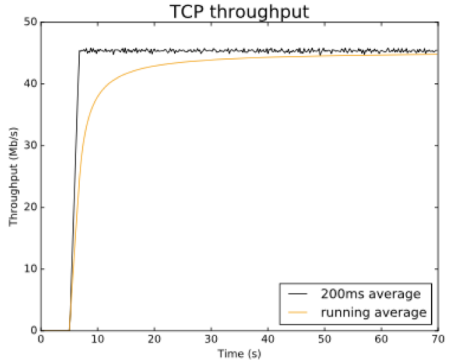
What got done

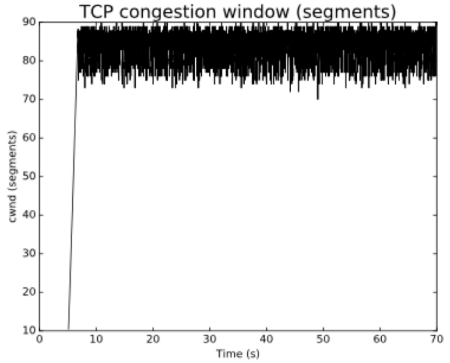
- Key results
  - New ns-3 branch integrating latest TCP Prague, Dual Queue, and tsvwg dual bottleneck scenario (in progress)
    - https://gitlab.com/tomhenderson/ns-3-dev/tree/hackathon-ietf-110
  - Finalize FQ-PIE and FQ-COBALT models
    - https://gitlab.com/nsnam/ns-3-dev/-/merge_requests/362
    - https://gitlab.com/nsnam/ns-3-dev/-/merge_requests/377
  - Confirm that TCP SACK blocks are handled correctly in PRR algorithm (in progress)
    - https://gitlab.com/nsnam/ns-3-dev/-/issues/59

Sample results

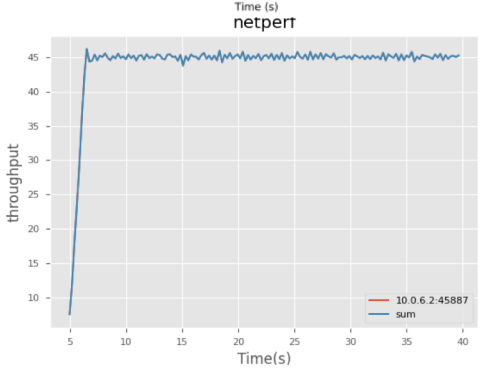
- Prague on single bottleneck (dual queue), ~50 Mbps bottleneck, 20 ms base RTT
- Observation: both implementations converge to similar congestion window values

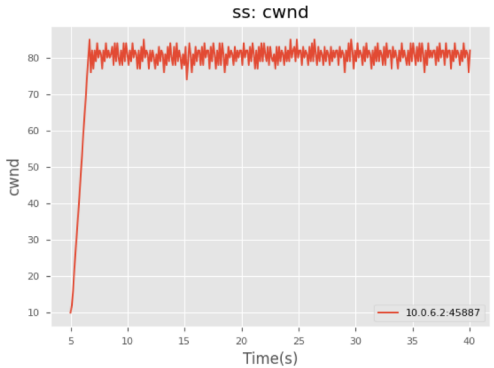
ns-3 (hackathon code)





Linux (results from
Deepak Kavoor *)





[* https://deepakkavoor.github.io/gsoc-2020-prague/](https://deepakkavoor.github.io/gsoc-2020-prague/)

What we learned

- Our wiki page for this hackathon (further details):
  - https://www.nsnam.org/wiki/Sprints - IETF_110_Hackathon.2C_March_1-4.2C_2021
- Lessons learned
  - Issues with existing drafts/RFCs: None this week
  - New implementation guidance: None this week
  - New feedback to take to WG: New testing capabilities being developed
  - New work to take to WG: None

Wrap Up

Team members:

Tom Henderson (champion), Sachin Nayak

First timers @ IETF/Hackathon:

Sachin Nayak

ns-3: https://www.nsnam.org