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), \(~50\text{ Mbps bottleneck, 20 ms base RTT}\)
- 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/
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