L4S Issues Related to CE Ambiguity

- #16, #17, #20, #21 ,#22

Issue #16
L4S - Interaction w/ 3168-only ECN [FIFO] AQMs

- Should still remain open, but making good progress on 3168-only AQM detection (see previous presentations)
- Prevalence moot if solution works;
  Solution moot if no prevalence
- Detailed solution design posted Nov'19 timeframe.
  Implemented and being evaluated
- Working well distinguishing DualPI2 and CoDel
  - CoDel is our most stringent test, given Qdelay is lowest

Issue #21
CE codepoint semantics

- General concerns about CE ambiguity
- Two specific concerns have been raised
  - #16 L4S - Interaction w/ 3168-only ECN [FIFO] AQMs
    - being actively addressed
  - #22 Deployment feasibility, including incremental (which is about a case where re-ordering can occur)
    - been addressed
  - No need for this generic placeholder issue as well?

Issue #20
Objection to ECT(1) codepoint usage

- “If ECT(1) is used for L4S ID, there should be a clear understanding of to what extent this precludes experimenting with SCE”
  - The question here should not be whether the L4S precludes SCE, but whether there's anything the community might want from SCE that it can't get from L4S
  - Any discussion of arrangements for parallel experiments depends on that

Issue #24—Evaluation & testing results

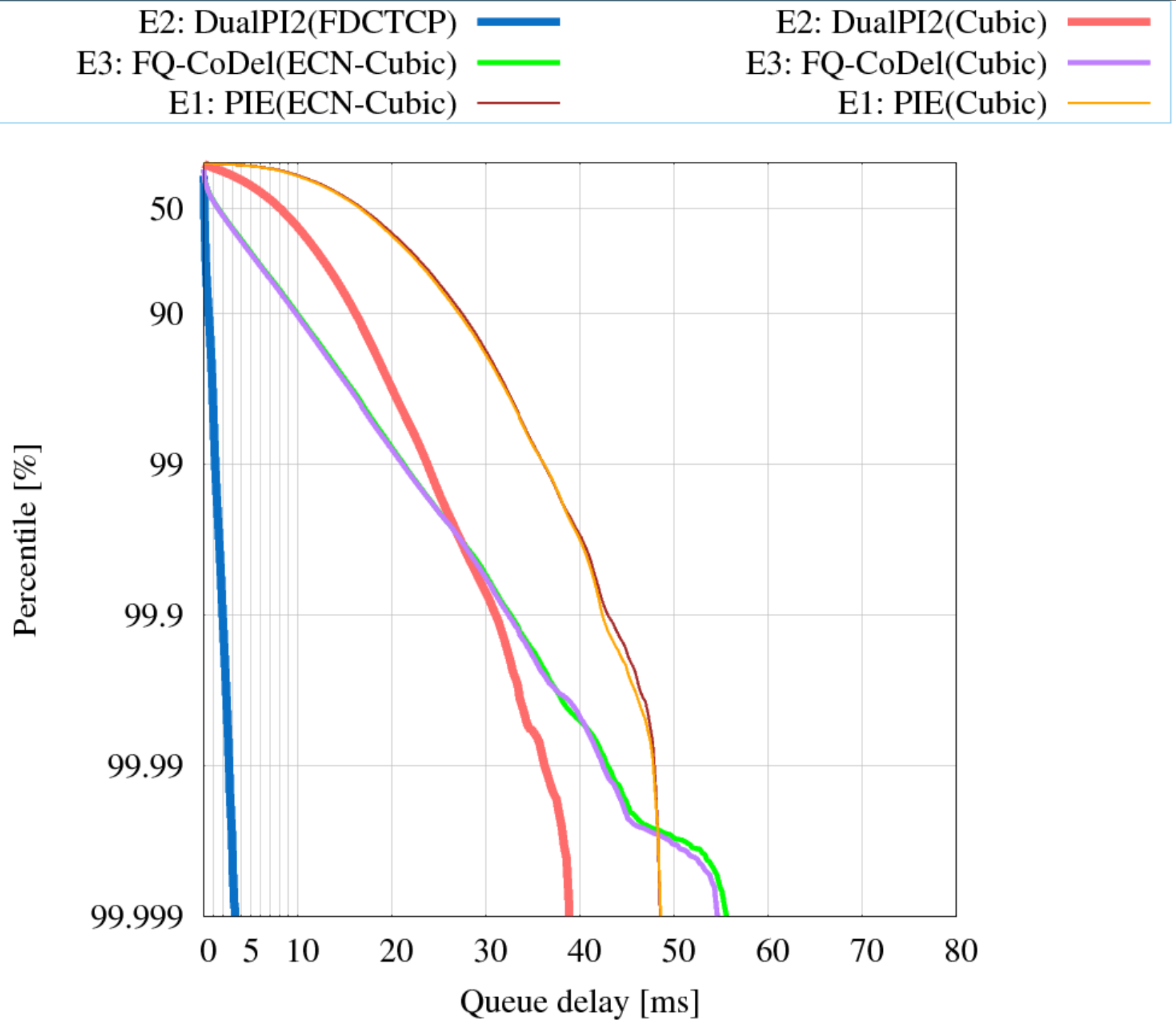
- Issue summary:
  - Questions about testing results and scenario's
  - Problems with availability of code to test and reproduce results

- Prague and DualPI2 code upgraded to latest kernel versions (full kernel tree available too)
- [1] Shows excerpt of the test suite run on the dualQ/TCP Prague:
  - Per packet measurement to witness actual tail latencies instead of using coarse-grained/smoothed estimates
  - Scenarios mixing:
    - Various bottleneck bandwidth (4-200M) and base RTTs (5-100ms)
    - Variable number of long-running flows, with Prague/Cubic/Reno/BBR(v2)
    - Dynamic load—from 10 to 500 web request per sec, downloading objects from 1kb to 1MB
    - Unresponsive UDP flow in either queue (overload experiments)
    - Mixed RTTs experiments
- [2] Tests reusing P. Heist's scenarios

- Proposal:
  - Close

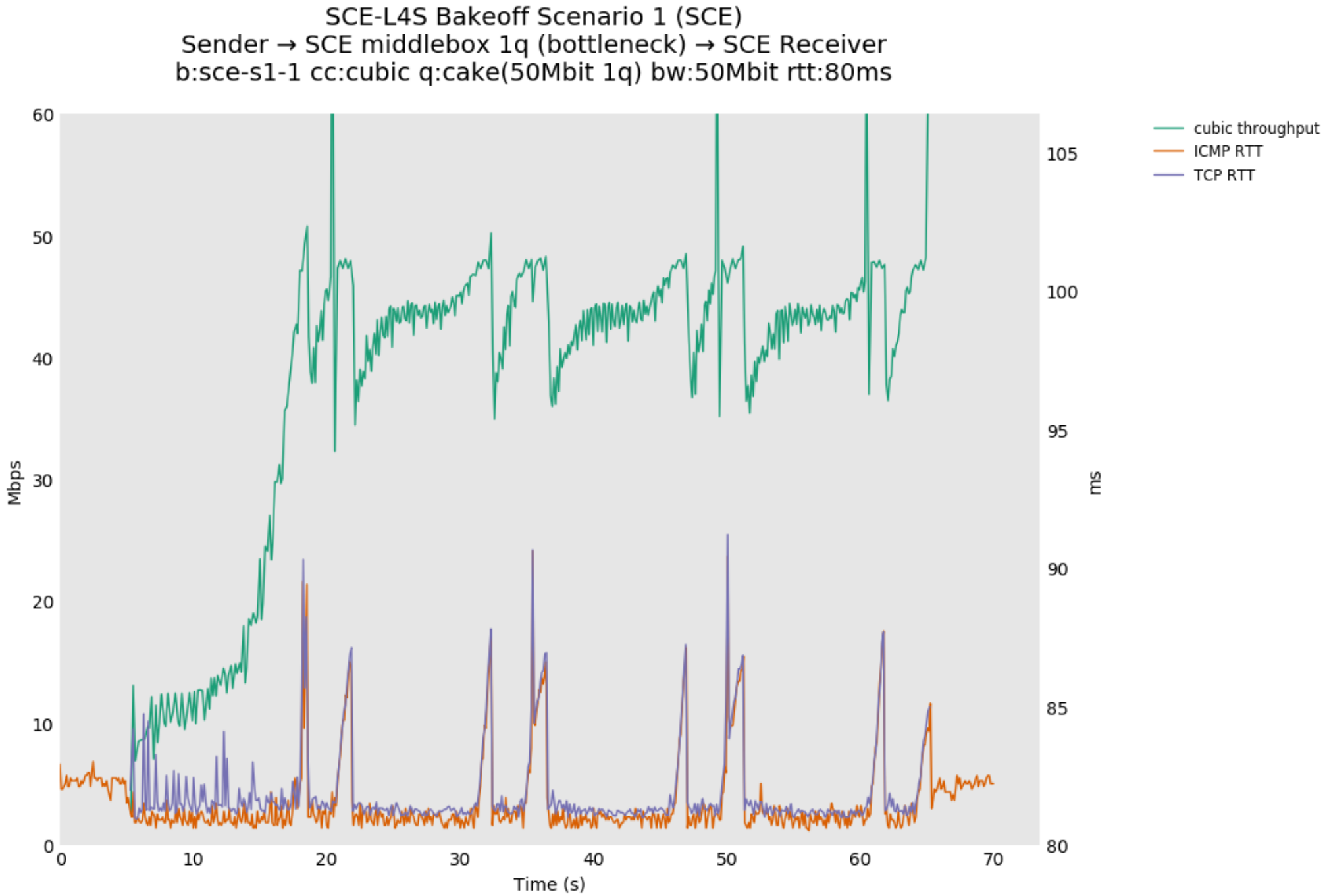
[1] http://bobbriscoe.net/projects/latency/dctth_journal_draft20190726.pdf
[2] https://l4s.cablelabs.com/l4s-testing/README.html

- Experiment made over a bottleneck of 120Mbps
- Per packet measurements during 5 mins
- Mixture of two long running flows and 200 web request/s

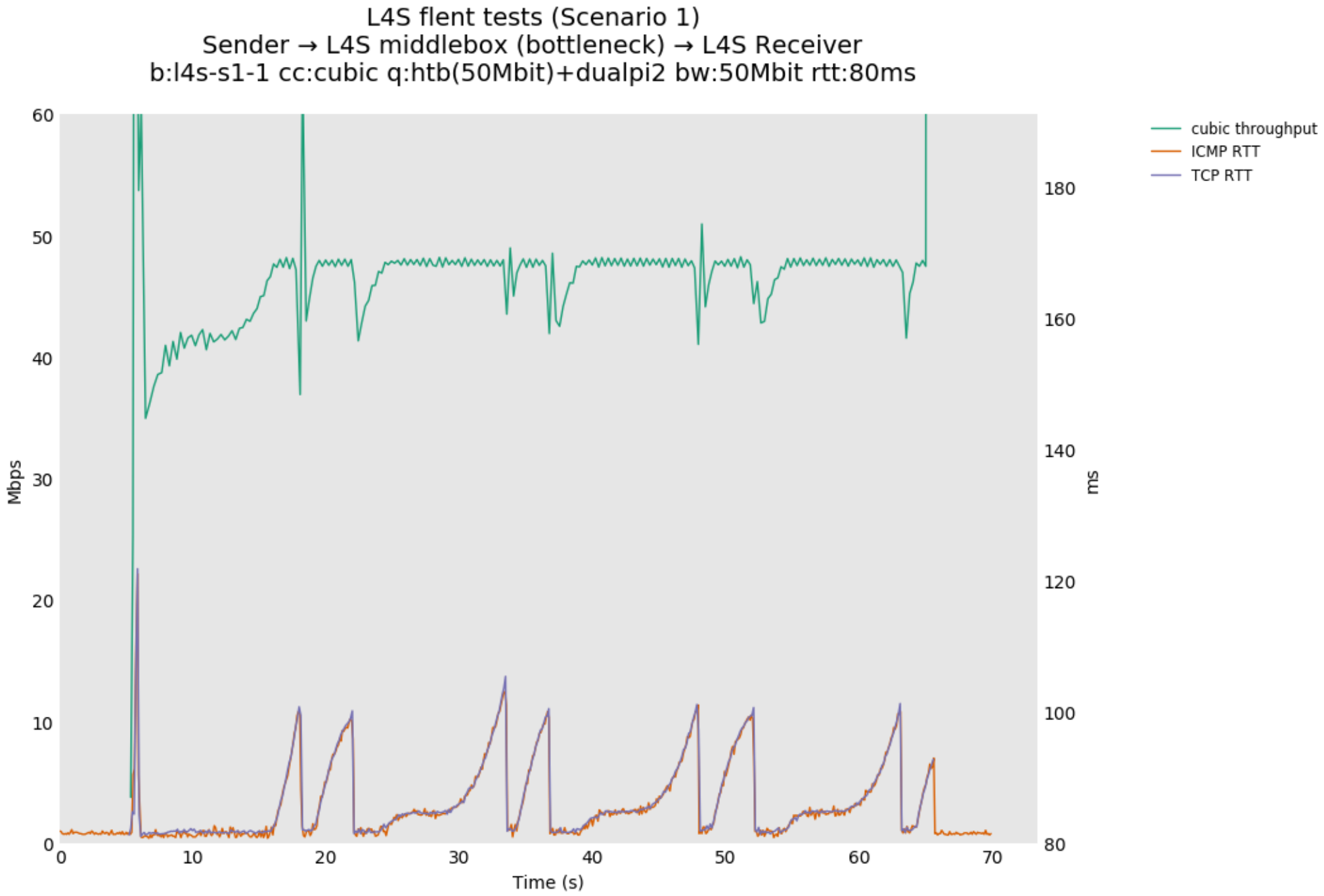


Issue #28—DualQ suitability

- Issue summary:
  - Claim that “DualPI2 needs to make sure that RTT-based unfairness is removed”
- Questions:
  - Is the goal of an AQM to police/verify RTT fairness between flows? Have these requirements also been imposed on PIE, CoDel, RED, …?
  - Shouldn’t the end-systems address the issues their behavior creates?
  - Is the end-system principle not applicable here? (Good design is to prefer end-system functionality above network functionality)
  - Possible AQM solutions are undesirable
    - provide per packet RTT information (no headers available)
    - Set Classic PI2 target to 1ms also (Classic underutilization and high drop probability)
    - Increase coupling factor to compensate worse case RTT ratio (L4S gets lower throughput in all other cases)
- Proposal:
  - Not an issue of the AQM (additional policers will be added on if-needed basis)
  - Prague CC is updated with definable target RTT mapping function (code released soon)
  - RTT-independence solves many issues on the internet as smallest seen base RTTs and queue latencies become smaller and smaller



[1] https://www.heistp.net/downloads/sce-l4s-bakeoff/bakeoff-2019-11-11T090559-r2/sce-s1-1/batch-sce-s1-1-cubic-50Mbit-80ms_var.png



[2] https://l4s.cablelabs.com/l4s-testing/key_plots/batch-l4s-s1-1-cubic-50Mbit-80ms_var.png