IETF 106 Hackathon
SCE

Some Congestion Experienced
Cheap Nasty Queuing
COBALT 2

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- Some Congestion Experienced:
  - draft-morton-tsvwg-sce-01
  - draft-grimes-tcpm-tcpsce-01
    - Testing more challenging traffic scenarios.

- Cheap Nasty Queuing:
  - draft-morton-tsvwg-cheap-nasty-queueing-01
    - Addressing SCE's applicability to single-queue AQMs.

- COBALT 2
  - SCE marking using a second Codel instance.

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SCE Traffic Scenarios

- Bursty Links on Path (eg. wifi MAC grant & aggregation):
  - Typically problematic for high-fidelity ECN downstream.
  - Verified this also affects SCE, with threshold or RED marking.

- Bidirectional Traffic on Asymmetric Path:
  - Checking sensitivity to congestion on ack path.

- Competition between SCE & non-SCE traffic:
  - SCE is known to give way to non-SCE…
    - Can we improve matters?

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- Addressing:- **SCE vs non-SCE competition**

- In a single-queue SCE-enabled AQM, SCE **gives way**.
- In a single-queue RFC-3168 AQM, SCE **competes fairly**.
- With FQ, SCE also competes fairly.

- Cheap Nasty Queuing has minimal extra complexity over FIFO.
  - Limits extent to which SCE gives way in competition.
  - Implemented GSO Splitting, and tested expected behaviour.

- CNQ also testbed for COBALT 2, with Codel SCE marking.

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- Addressing:- **Bursty Links on Path**

- Simulated using Linux sch_netem "slot" and "jitter" modes.
  - Throughput dropped to ~7Mbps over 80ms nominal path.
  - SCE not alone in this behaviour; known limitation of RED.

- Switched SCE marking to Codel algorithm instead of RED.
  - This is COBALT 2: two Codels and one BLUE instance.
  - Throughput now ~40Mbps over same path.

- Great success!

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Addressing:- **Bidirectional Traffic on Asymmetric Path**

- Important stress test: 10:1 link capacity, 1:50 flows.
  - Ack stream of single fast flow becomes a "bulk" flow itself.

- Random snags during other work ate time we wanted for this.
  - TCP Pacing stopped working on our testbed, generating confusion in test results. (Fixed using sch_fq.)

- Work on this will continue after Hackathon.
  - Additional RFC-5033 related testing as well…

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Addressing:- **AccECN and SCE compatibility**

- FreeBSD/RACK code to allow access to the TOS byte.
    - Needed by both AccECN and SCE.

- Discussed possibility of SCE adopting ECN++.

- FreeBSD FQ-Codel SCE implementation code improved.
    - Nearer to code review.

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Team Members

- Jonathan Morton
- Pete Heist
- Rodney Grimes
- Loganaden Velvindron
- Richard Scheffenegger

- All part of ongoing SCE work in TSVWG

`https://github.com/chromi/sce`