A Mechanism for ECN Path Probing and Fallback

draft-kuehlewind-tcpm-ecn-fallback-00

Mirja Kühlewind and Brian Trammell

IETF 87 Berlin

The problem

- ECN readiness of servers in the Internet rapidly increasing[1]
  - (17% in 2011 — 25-29% in 2012)
- Barriers to ECN activation (i.e. dodgy middleboxes) much less widespread than ten years ago, but:
  - 8.2% of probed paths didn't echo CE
  - 0.9% of observed paths dropped CE packets
- Enabling ECN implementations to adapt to these situations would remove another barrier to activation.

[1] Kühlewind, Neuner, Trammell, *On the State of ECN and TCP Options on the Internet*, Passive and Active Measurement (PAM) 2013

The proposal

- Simulate ECN CE markings after ECN negotiation:
  - Set CE on first 3 (data) segments after IW
  - All 3 data segments lost → assume ECN unusable on path, disable
  - ECE not set on ACK for data segments → assume CE or ECE cleared along path
  - ECE set on ACK → ignore and set CWR
- Disable ECN on flows < one IW of data

Discussion

- General case:
  - send J ECT(n) followed by K CE
    - fallback on non-ambiguous signal that ECN causes the problem
- Current draft: (J,K) = (0,3)
- Other parameters may be worth evaluating.

The experiment

- Implement ECN fallback in Linux kernel
- Connect to various websites
  - w/ large HTTP request
- Evaluate fallback results
- *Measurements ongoing*, find us in the hallway.

Future work

- Integration of ECN nonce
  - could distinguish CE cleared from ECE dropped case on probe.
- Investigation of other (J,K) values
- Further experimentation
  - Hypothesis: this approach is safer than using ECN without it on the open