

# Operational Guidance for Deployment of L4S in the Internet

[draft-ietf-tsvwg-l4sops-00](#)

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# Status

- Individual Draft
  - Draft-00 (July 2020) discussed @IETF108
  - Draft-01 (Nov 2020) discussed @IETF109
  - Draft-02 (Feb 2021) discussed @IETF110
- WG Draft Adopted on March 26
  - WG-Draft-00 (May 2021)

# Summary of Deltas in WG-Draft-00

- New Section 3.1 summarizing recent studies of RFC3168 deployment
  - Akamai (2020)
    - 5-7 ASNs show significant deployment
    - Global baseline of ~0.3% of paths
  - Apple (2018)
    - China: 1% of paths
    - Mexico: 3.2% of paths
    - France: 6% of paths (large deployment of fq\_codel by Free.fr)
  - Pete Heist (2021)
    - Small cooperative ISP (660 members)
    - Deployment of fq\_codel in subset of backhaul links
    - Aside from backhaul, observed CE-marking on ~10% of paths (33 IPs)
- New Section 6 discussing actions that can be taken by an operator of FQ bottlenecks:
  - Update to L4S-awareness
  - Treat ECT(1) as NotECT
  - Tunnel ECT(1) with NotECT in outer header
  - Re-mark ECT(1) to NotECT
- New Section 7 discussing conclusion of the L4S experiment

# Outline

1. Introduction
2. Per-Flow Fairness
3. Detection of Classic ECN Bottlenecks
  - 3.1. Recent Studies
  - 3.2. Future Experiments
4. Operator of an L4S host
  - 4.1. Edge Servers
  - 4.2. Other hosts
5. Operator of a Network Employing RFC3168 FIFO Bottlenecks
  - 5.1. Configure AQM to treat ECT(1) as NotECT
  - 5.2. ECT(1) Tunnel Bypass
  - 5.3. Configure Non-Coupled Dual Queue
  - 5.4. WRED with ECT(1) Differentiation
  - 5.5. Disable RFC3168 Support
  - 5.6. Re-mark ECT(1) to NotECT Prior to AQM
6. Operator of a Network Employing RFC3168 FQ Bottlenecks
7. Conclusion of the L4S experiment
  - 7.1. Successful termination of the L4S experiment
  - 7.2. Unsuccessful termination of the L4S experiment

# TODOs & Discussion

- Intro: further discussion on severity and who might be impacted
- Operator of Host: discussion of risk of incorrectly classifying a path
- Other Hosts: more info on ways to cache/maintain list of 3168 paths
- Discussion of replay attack window implementations in VPNs?
- Re-mark ECT(1) to NotECT: delete this or explain why violating an ECN-L4S-ID requirement is acceptable (as a last resort)
- Usage of DSCP as a network mechanism?