

# Adding ECN Capability to TCP's SYN/ACK Packets

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[draft-kuzmanovic-ecn-syn-00.txt](#)

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## Purpose:

- Specifies a modification to RFC 3168 to allow TCP SYN/ACK packets to be ECN-Capable.
- Based on the SIGCOMM 2005 paper by A. Kuzmanovic.
- Avoids the retransmit timeout when a SYN/ACK packet is dropped.
- If the SYN/ACK packet is ECN-marked, the sender of that packet responds by reducing the initial window to one segment, instead of two to four segments.

## More:

- The SYN/ACK packet can be sent as ECN-Capable only in response to an ECN-setup SYN packet.
- The SYN packet still **MUST NOT** be sent as ECN-Capable.
- The benefit of adding ECN-capability to SYN/ACK packets can be high, particularly for small web transfers.

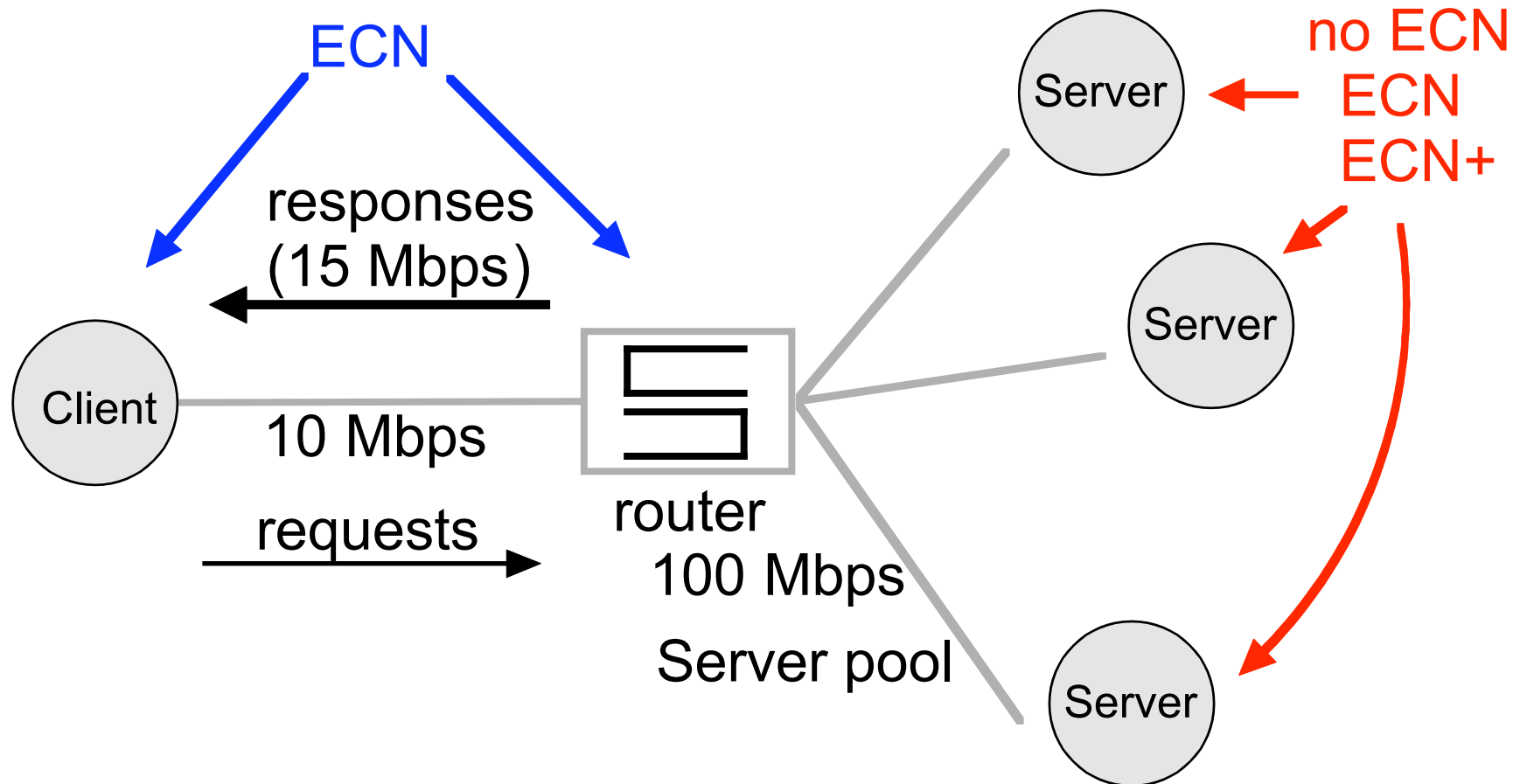
# Security Concerns:

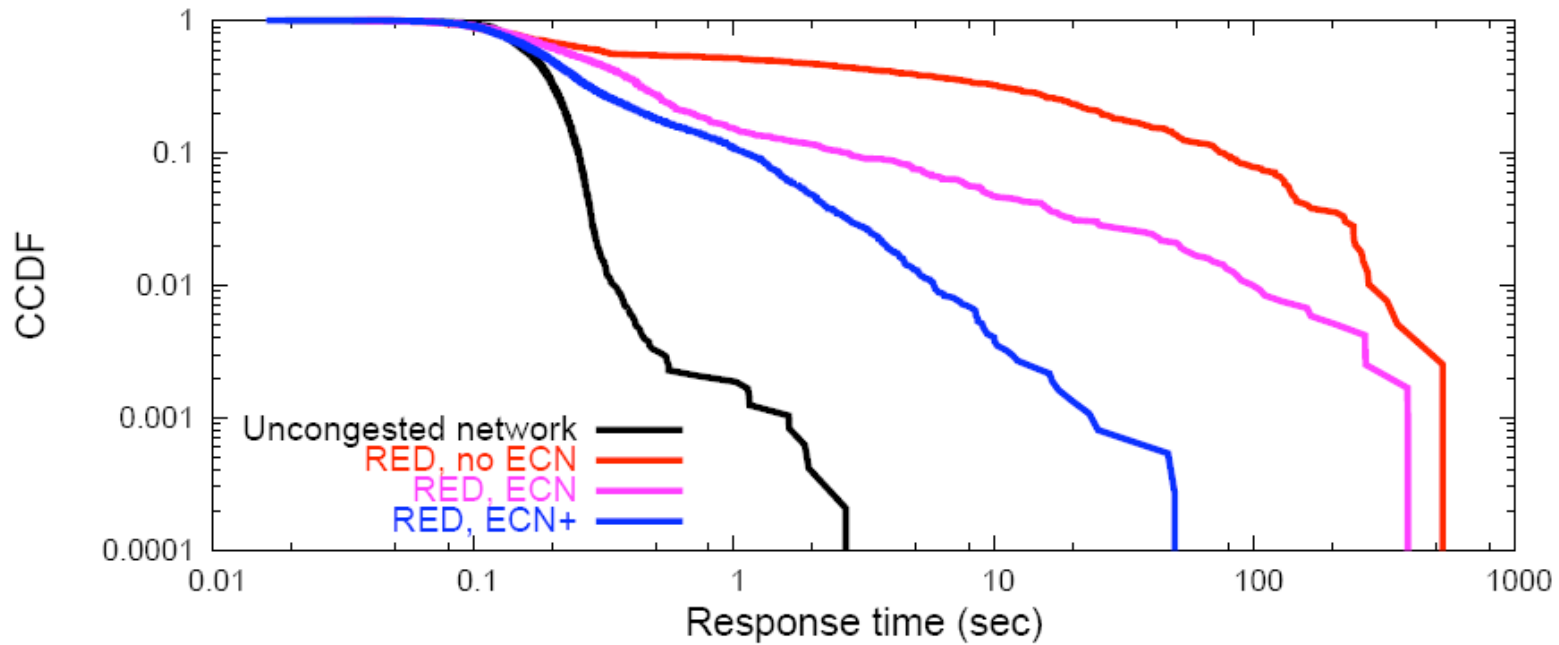
- “Bad” middleboxes that drop ECN-Capable SYN/ACK packets?
  - We don’t know of any.
  - If the first SYN/ACK packet is dropped, the second one should be sent as not ECN-Capable.
- There is no danger on congestion collapse:
  - Routers are free to drop rather than mark ECN-Capable packets.
  - If the SYN/ACK packet is marked, the sender sends at most one data packet; if that packet is dropped or marked, the sender waits for a retransmit timeout.

## Testbed Experiment:

- From Aleksandar's SIGCOMM 2005 paper on “The Power of Explicit Congestion Notification”.

# Testbed Experiments





|             | Average Response Time | Throughput (% of capacity) |
|-------------|-----------------------|----------------------------|
| RED, no ECN | 26 sec                | 44%                        |
| RED, ECN    | 4.5 sec               | 56%                        |
| RED, ECN+   | 0.5 sec               | 99%                        |

Reasonable performance despite huge congestion



## Details of testbed experiment:

- 15 Mbps arrival rate, 10 Mbps service rate.
- Very short transfers.