# Router Siblings

NPS-SIX
January 7, 2013
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# Some (Bad) Ideas

- DNS-based:
  - Reliable? Probably not…
- ICMPv6 Node Information Queries (RFC4620)
  - "An implementation of this protocol MUST have a default configuration that refuses to answer queries from global-scope addresses"
- Router fingerprinting (nmap style)
  - Not enough diversity?
- ICMP4 in IPv6 (next-header 4):
  - ICMP6 parameter problem ☹
- ICMP6 hop-by-hop timestamps
  - IETF ID, not implemented….

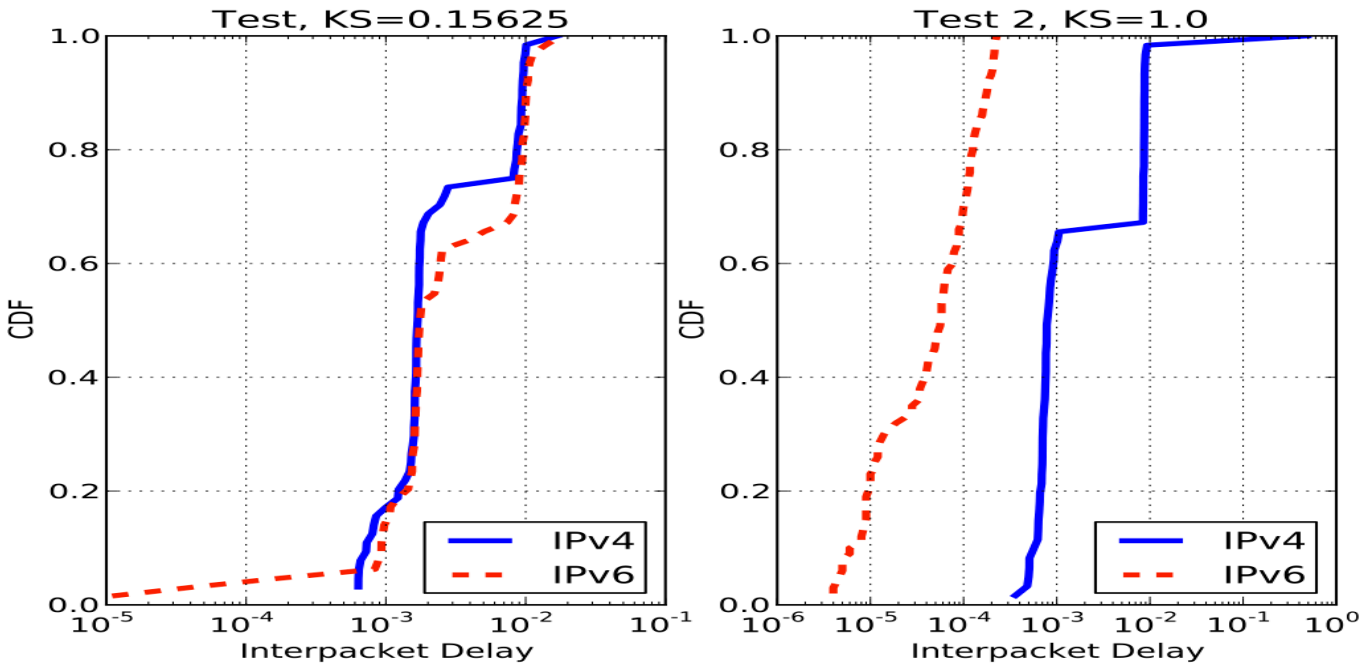
# ICMP Packet Train

- Routers typically respond to ICMP/ICMP6
- Idea:
  - Send train of (interleaved) ICMP and ICMP6 probes to candidate sibling pair
  - Analyze interpacket delay differences
- Can this possibly work?

# ICMP Packet Train

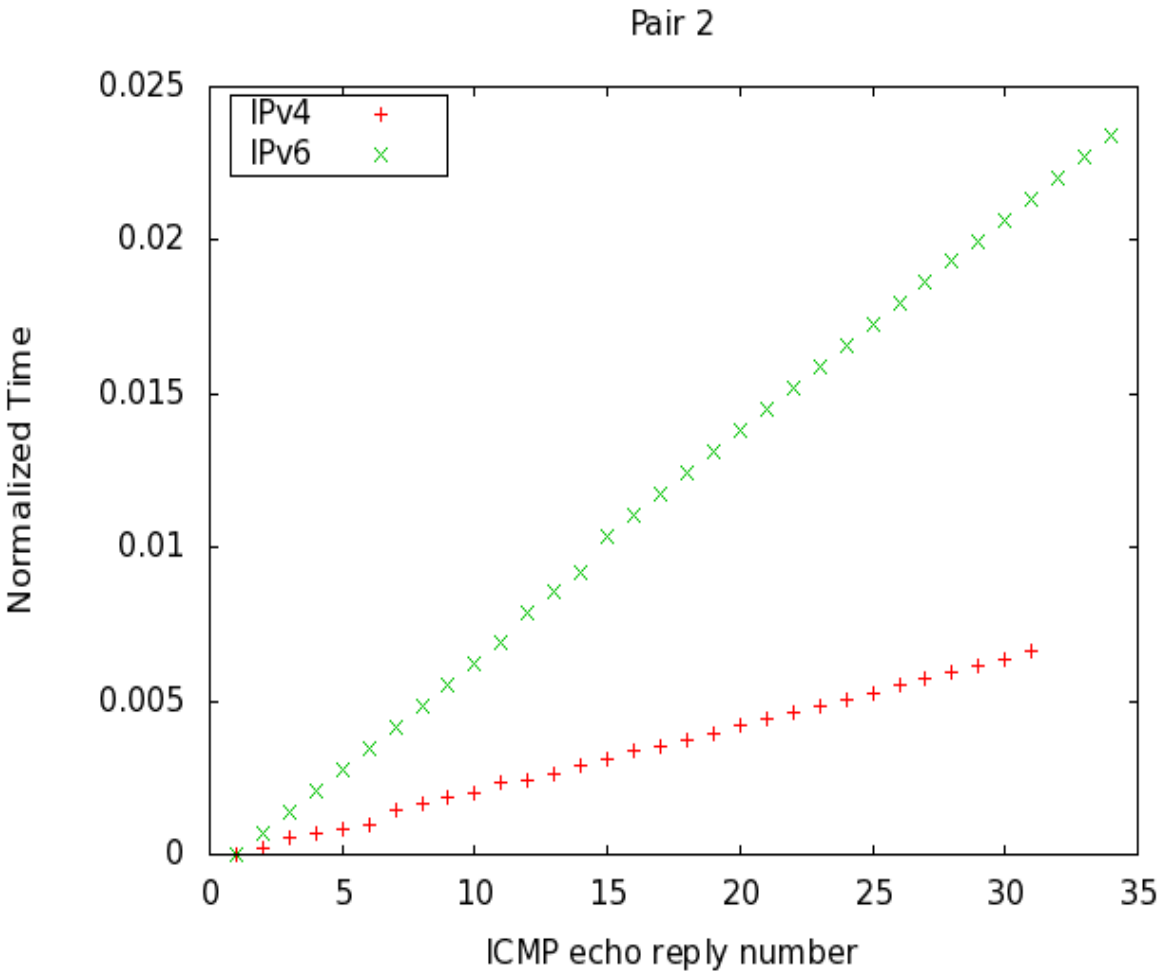
- Intuition:
  - Routers distribute data-plane forwarding, centralize control-plane (e.g. proc ICMP)
  - Routers often rate-limit ICMP (serves as fingerprint?)
  - Router bandwidth from line-cards to central processor limited (still true? E.g. M40=100Mbps)
  - Router ICMP generation delay? ~0.5ms (Govindan, Paxson 2002), but with 1,2,3ms modes. (Still true today?)
  - Timing characteristics will reveal shared congestion patterns?

# Contrived Example in Lab



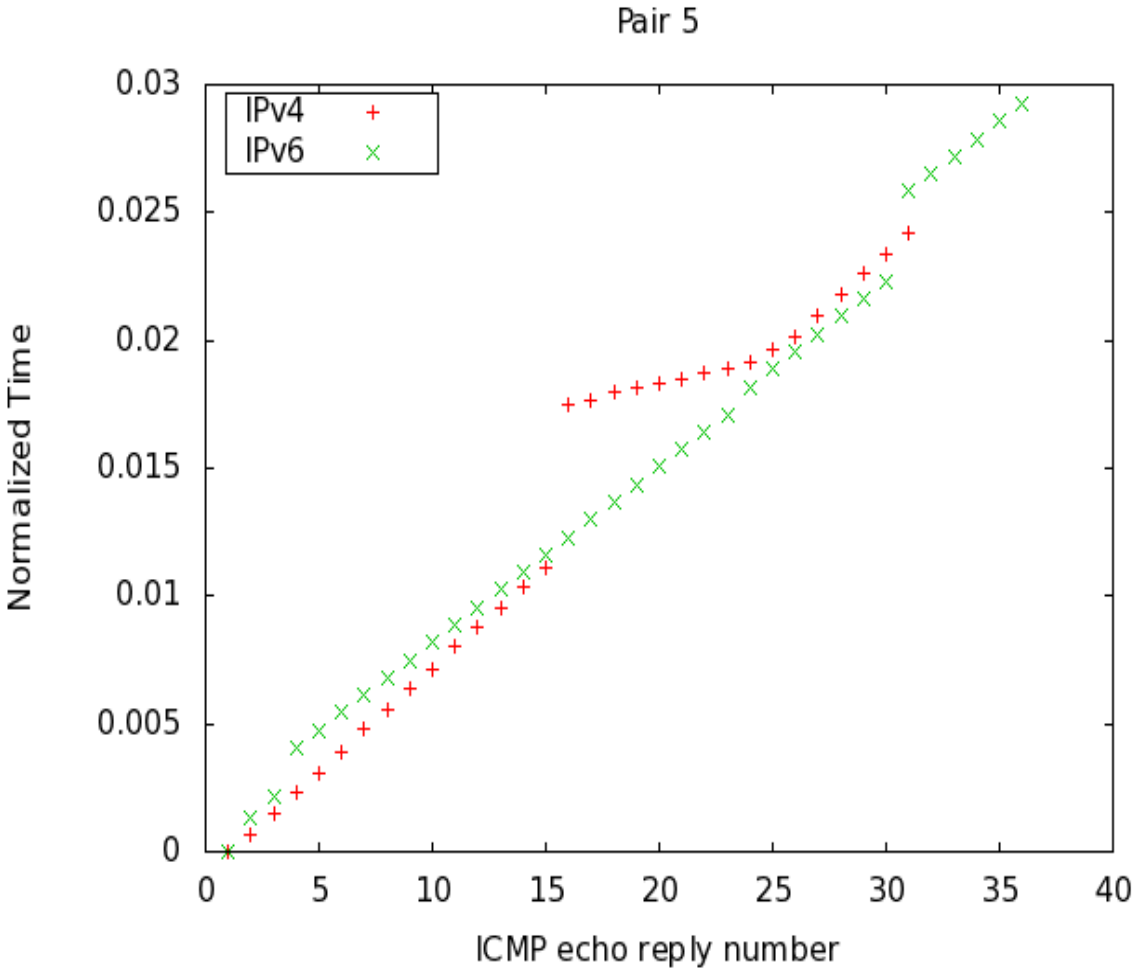

- A4,A6 siblings. A4,A6 address single physical interface. B6 other host.
- Congest A4,A6's physical interface
- Run interleaved v4/v6 packet trains to all

# Never as clean in practise



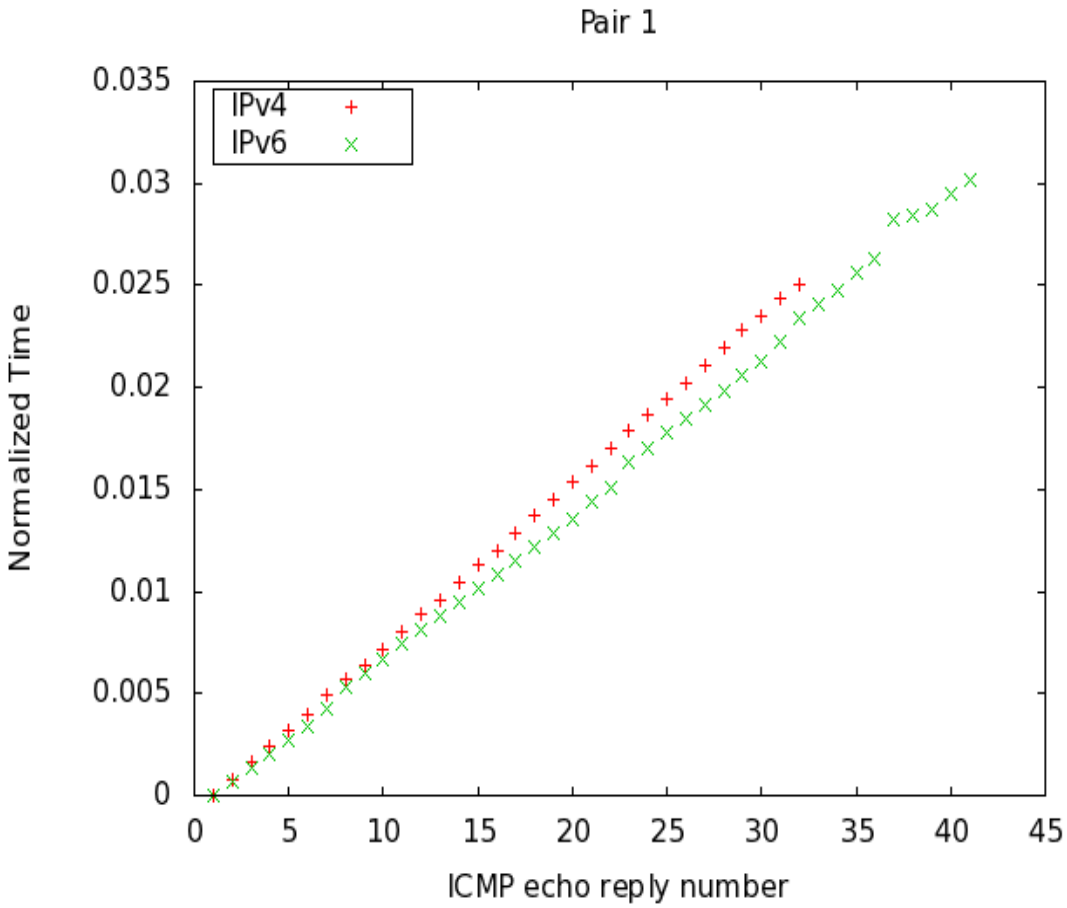

- Known rtr siblings
- V4 processed faster than v6?

# Never as clean in practise



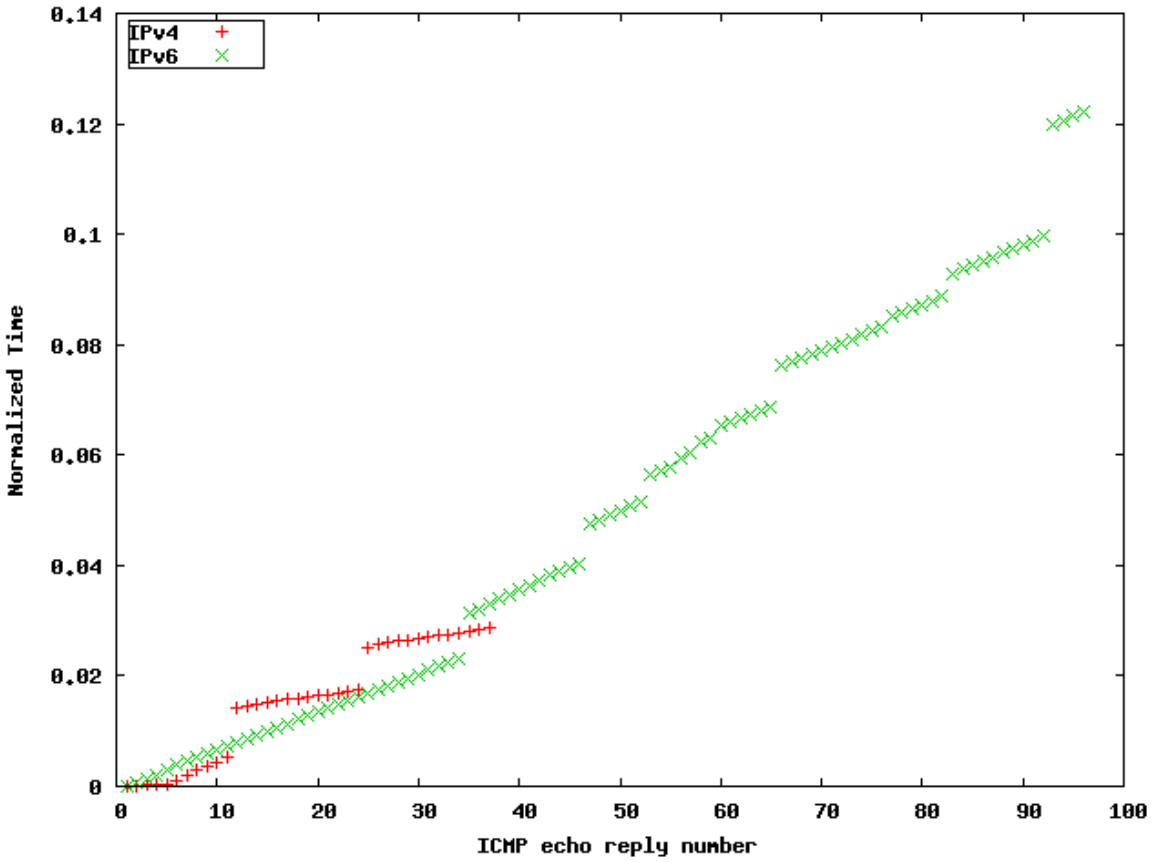

- Known rtr siblings
- Queue on v4 path not on v6 path?

# Never as clean in practise




- Known rtr siblings
- V4 and V6 paths congruent?

# Rate Limit Fingerprint?




- Known rtr siblings
- V4 rate limited, but v6 not?
- Bursts indicative of congestion or processing?

# Summary

- Lots more work to do…
- Questions/flames?