DNS Root/gTLD Performance Measurements

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Measuring DNS Server Performance

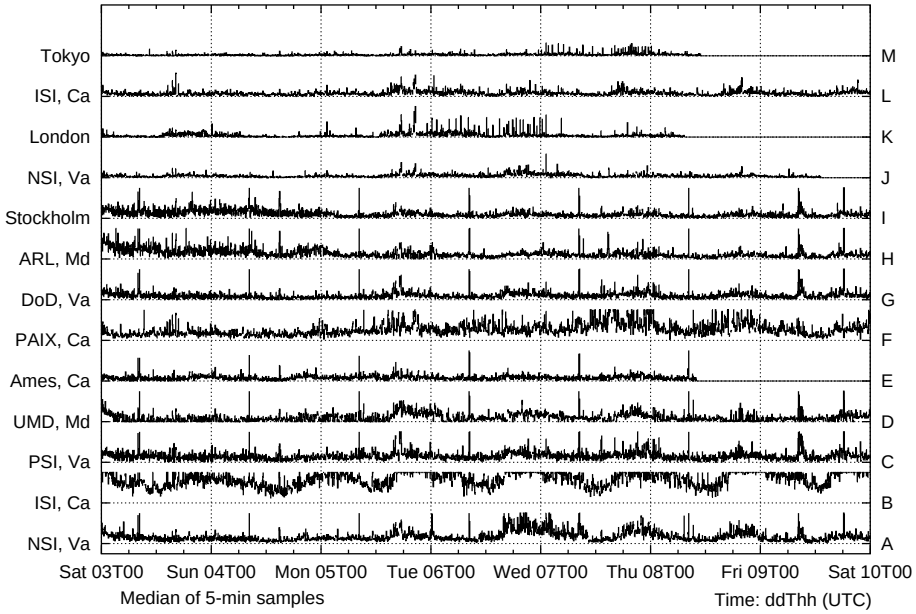
- Observe DNS packets leaving and returning to UCSD campus
- Use optical splitter to tap OC12 link (stealing 5% of the light)
- Use *NeTraMet* meter to pick out DNS packets
  - Look for DNS request and corresponding response (match the DNS ID field)
  - Time packets to get RTT; Count packets to get query rate
  - Count requests with no response to get loss rate

Query Rate to Root Servers

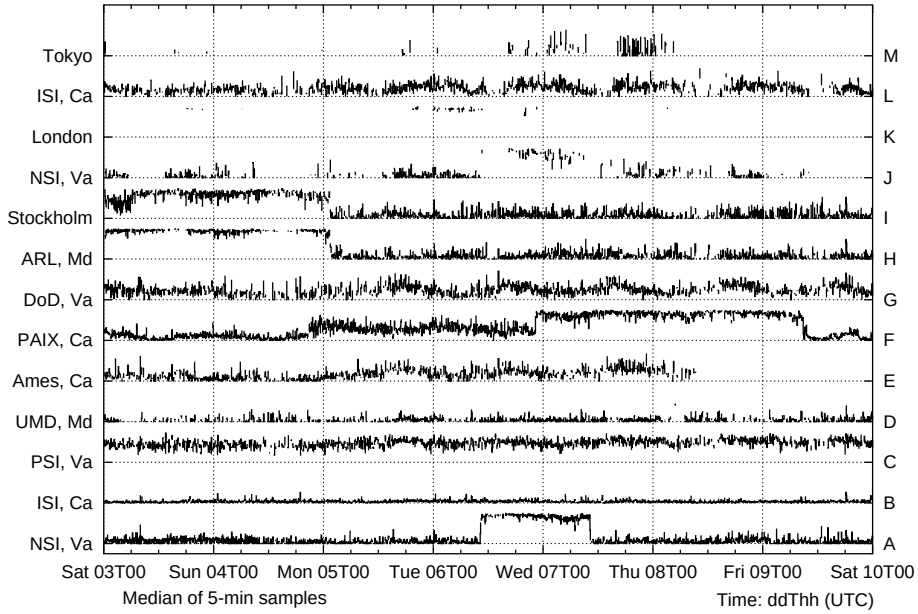
- Graphs done with gnuplot, show median (50%) over 5 minute intervals
- IQR plots show difference between 25% and 75%
- Data not plotted for intervals with $<$10 events
- Can see daily variations
  - Times are UTC, i.e. 8 hours ahead of San Diego
  - Cut off tops indicate $>$200 queries per 5-minute interval
- BIND does its own internal load balancing based on RTT
  - Most requests go to a small group of ‘low rtt’ servers
- BIND (almost) stops sending requests when connectivity is lost

Root Servers: Observed at UC San Diego: Week from Sat 3 Nov 01

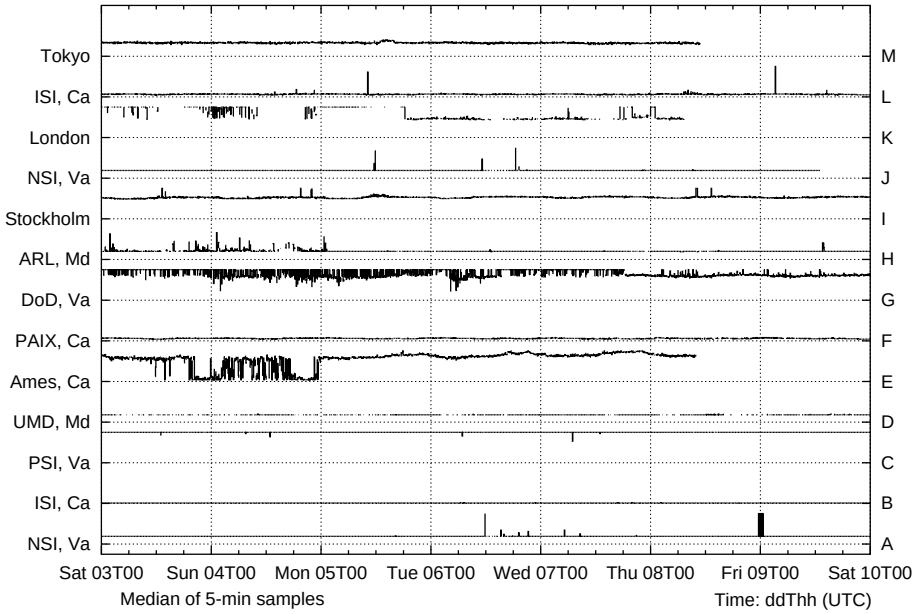
Root Requests at UCSD for week from Sat 03 Nov 2001, scale 0-200 packets



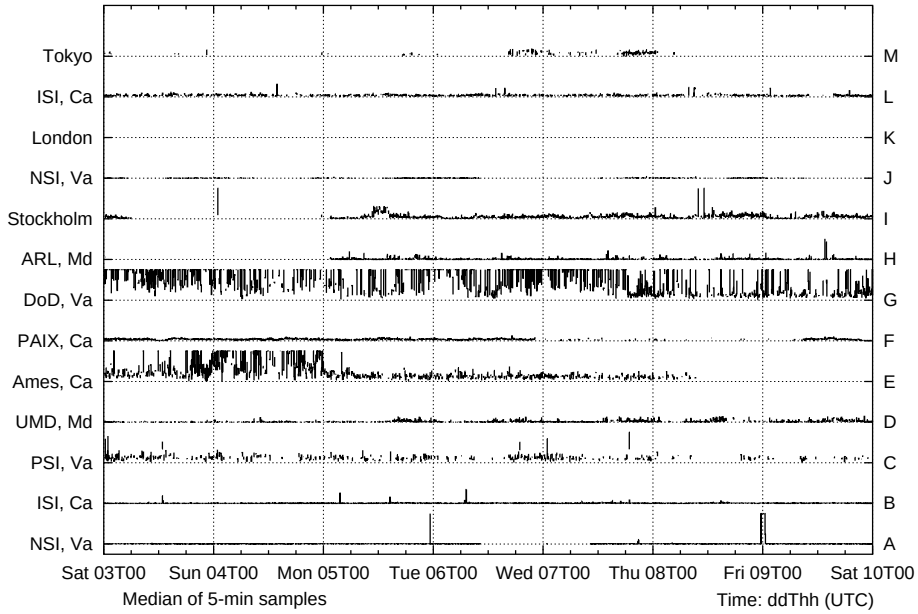
Root Request Loss Rate at UCSD for week from Sat 03 Nov 2001, scale 0-100 %



Root Response Time at UCSD for week from Sat 03 Nov 2001, scale 0-300 ms

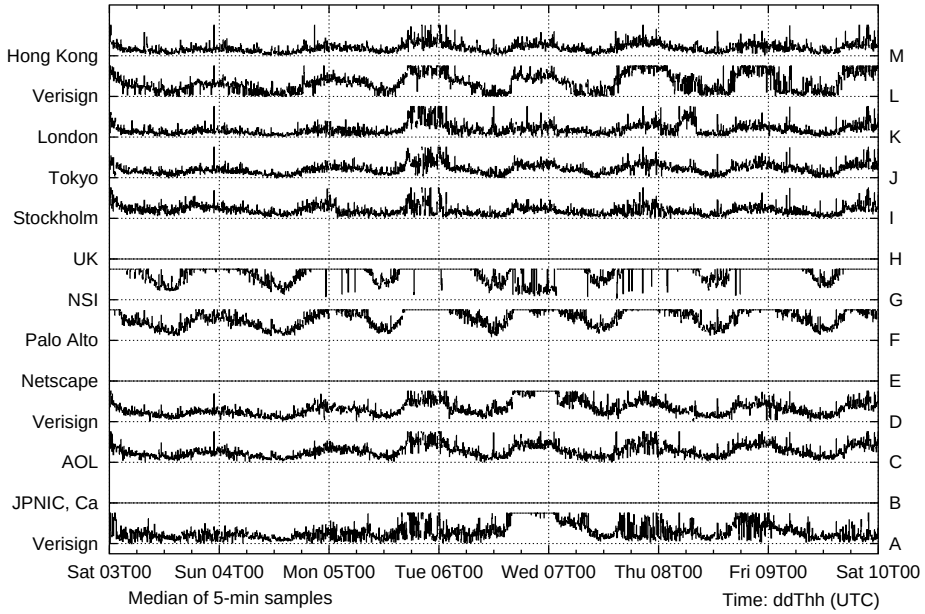


Root Inter-quartile Range at UCSD for week from Sat 03 Nov 2001, scale 0-75 ms



gTLD Servers: Observed at UC San Diego: Week from Sat 3 Nov 01

gTLD Total Requests at UCSD for week from Sat 03 Nov 2001, scale 0-200 packets



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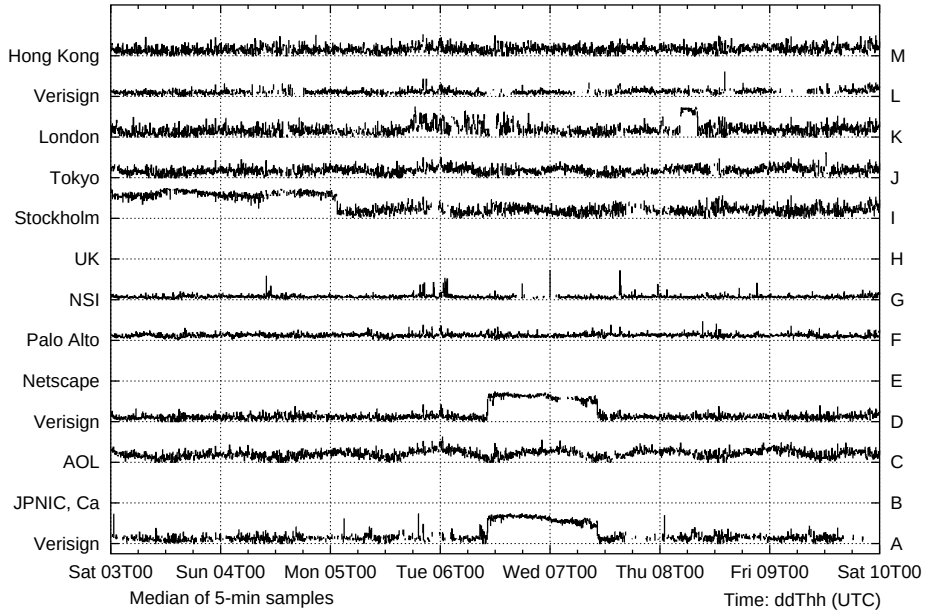

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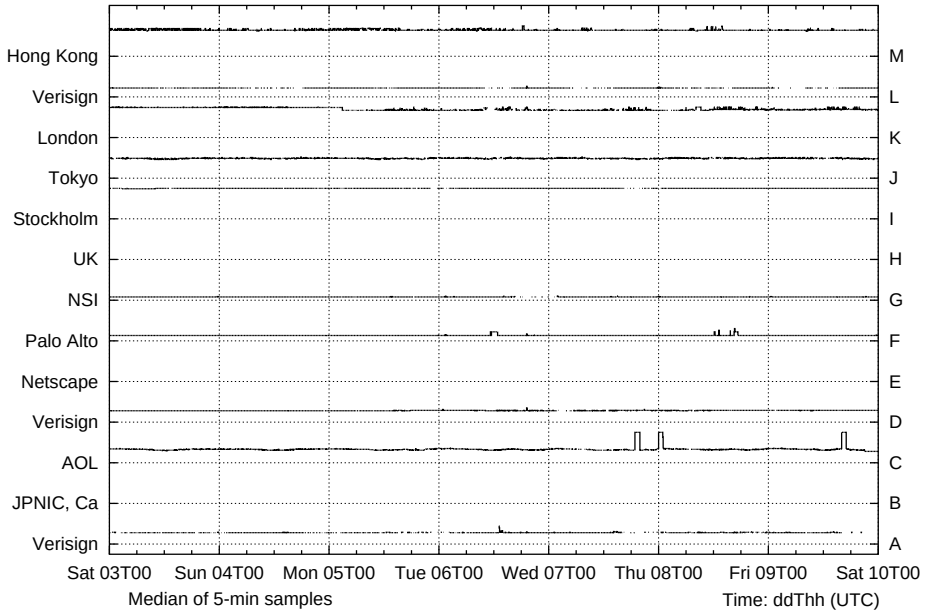

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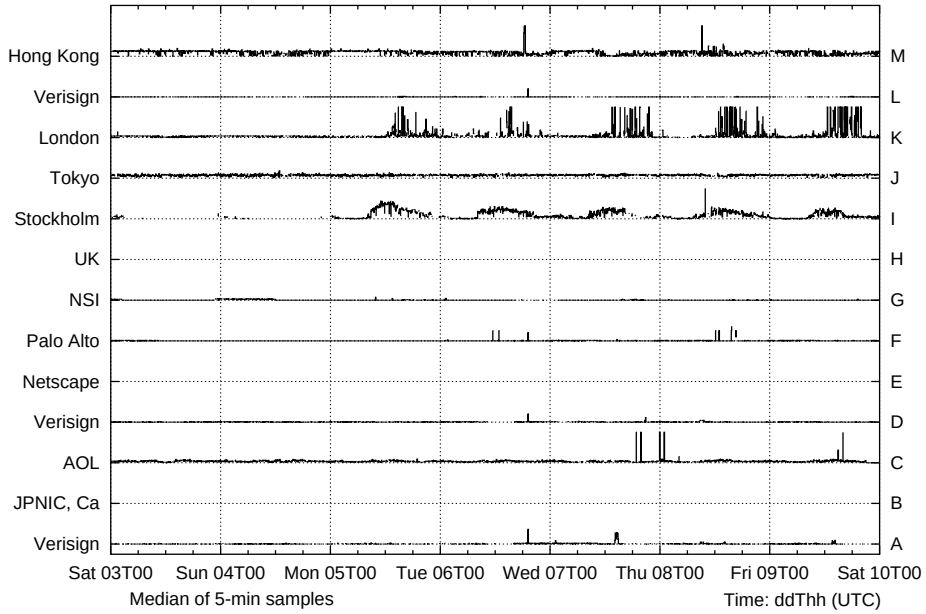
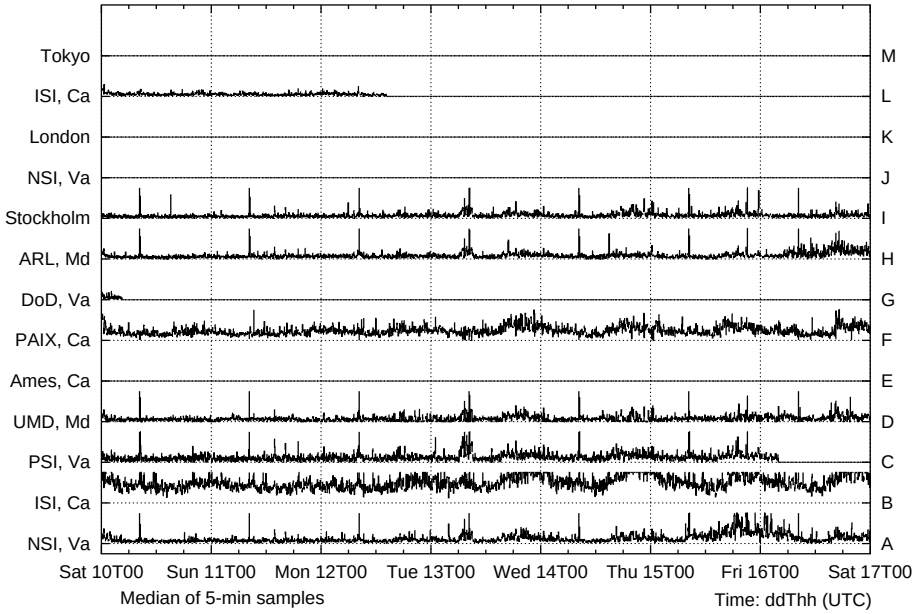


Root Servers: Observed at UC San Diego: Week from Sat 10 Nov 01

Root Requests at UCSD for week from Sat 10 Nov 2001, scale 0-200 packets



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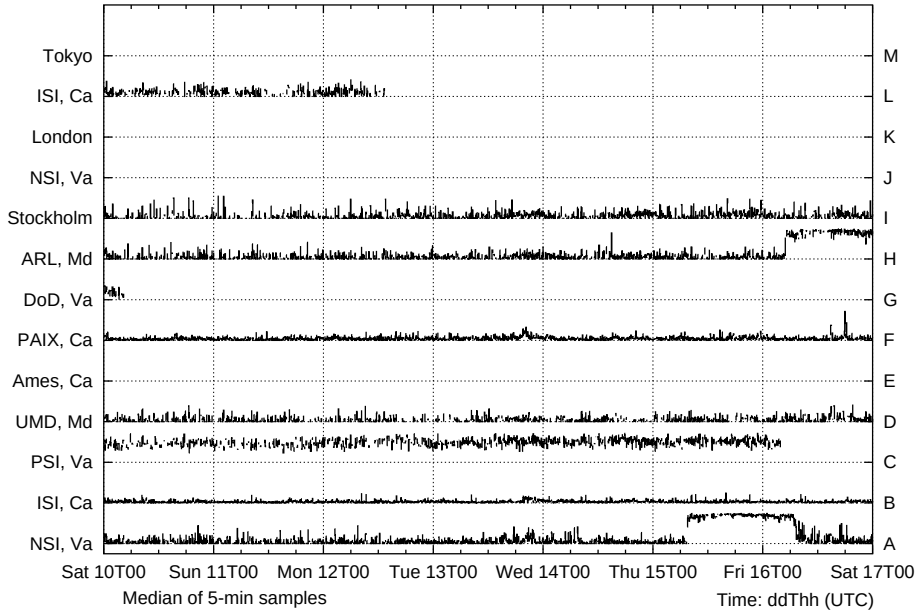

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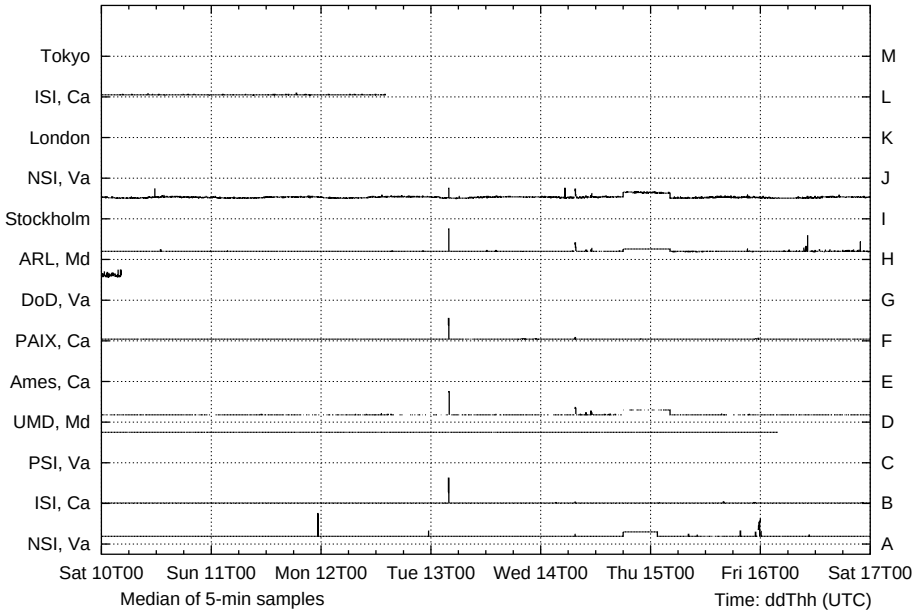

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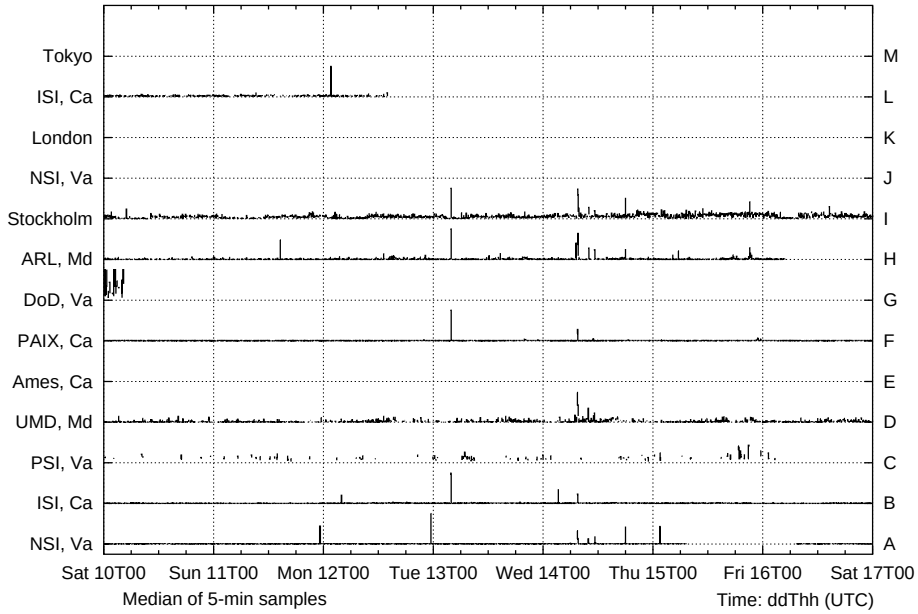

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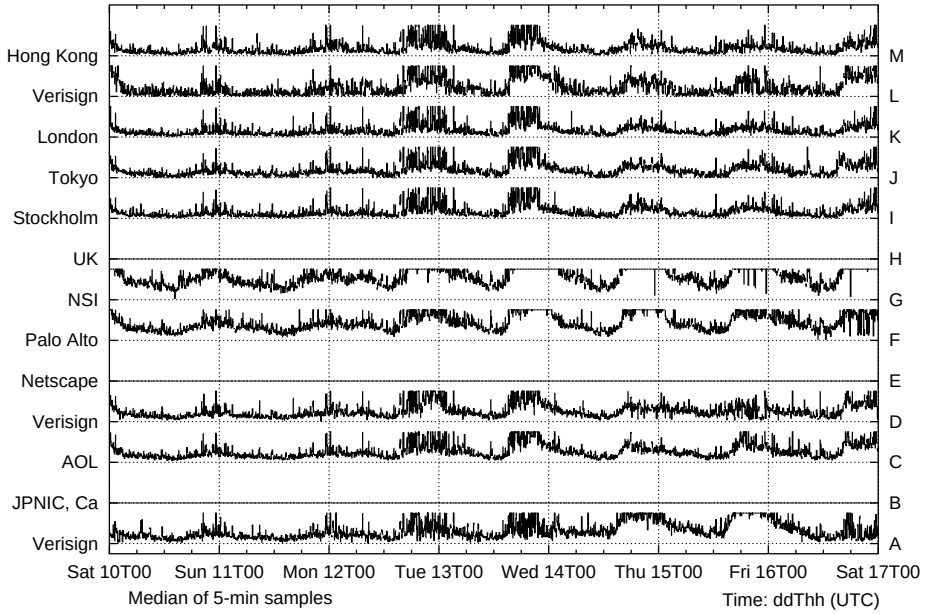
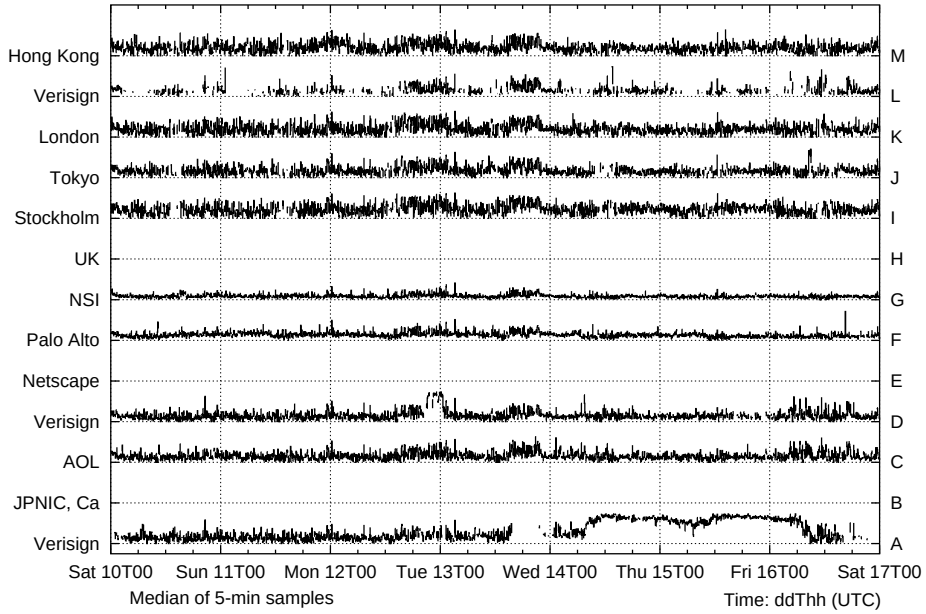


gTLD Request Loss Rate at UCSD for week from Sat 10 Nov 2001, scale 0-100 %



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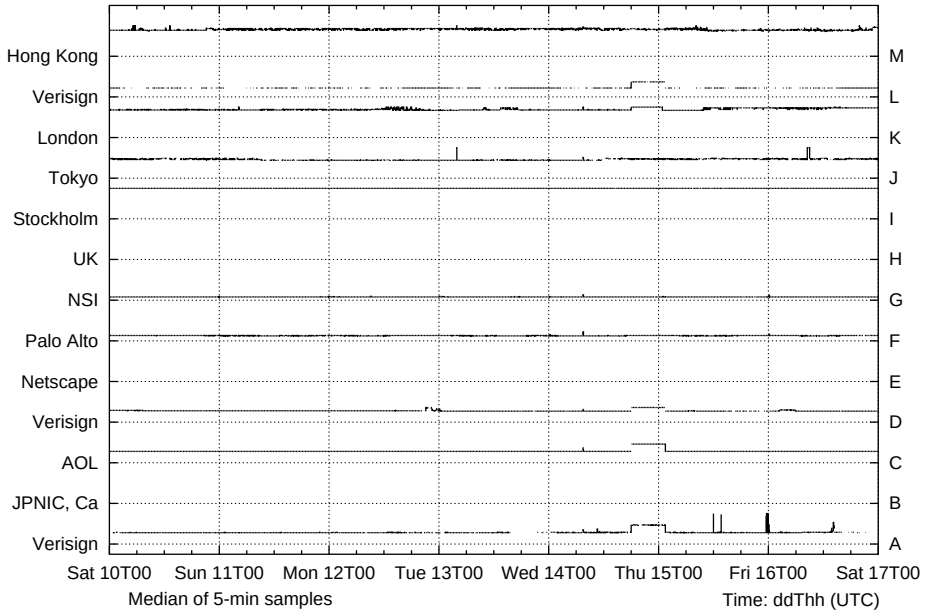
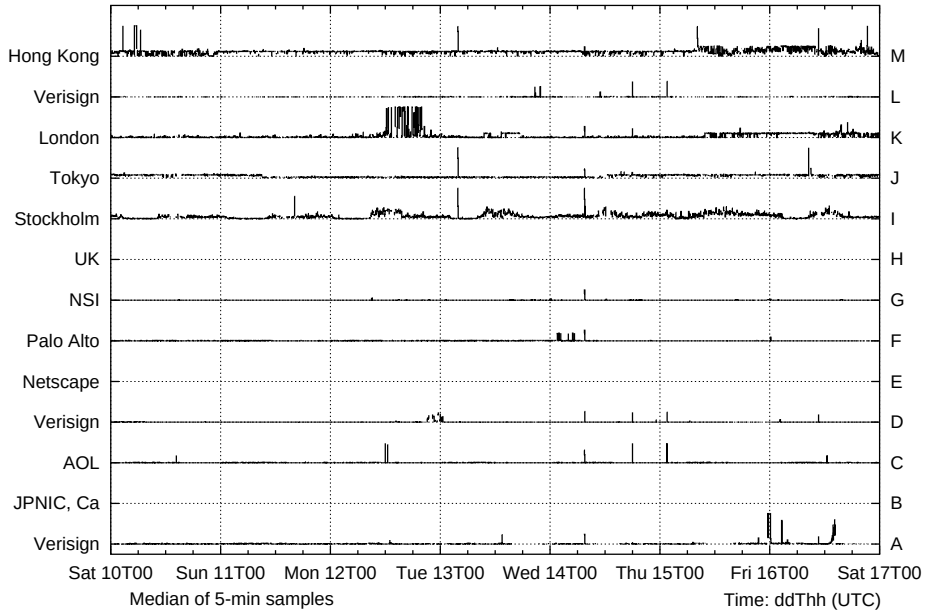
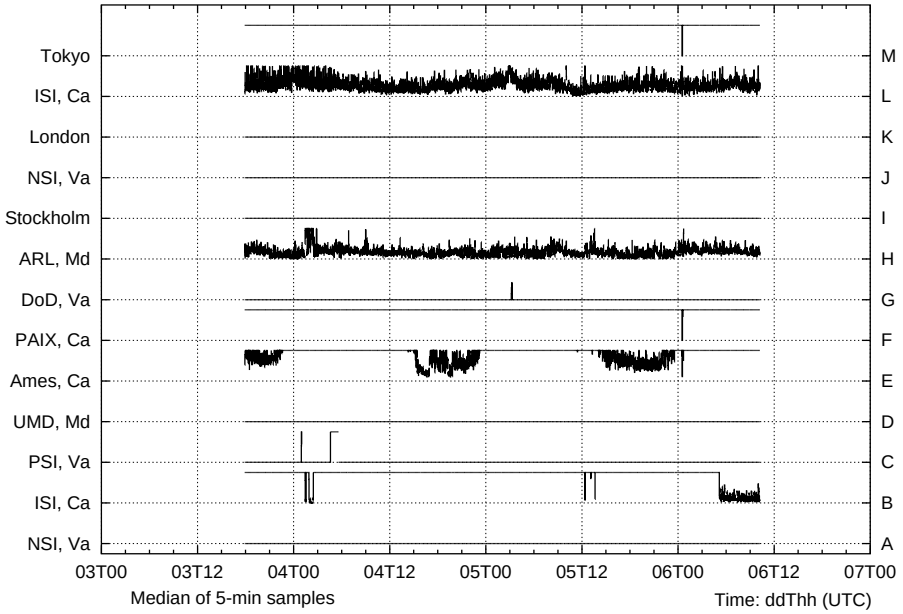


gTLD Inter-quartile Range at UCSD for week from Sat 10 Nov 2001, scale 0-75 ms

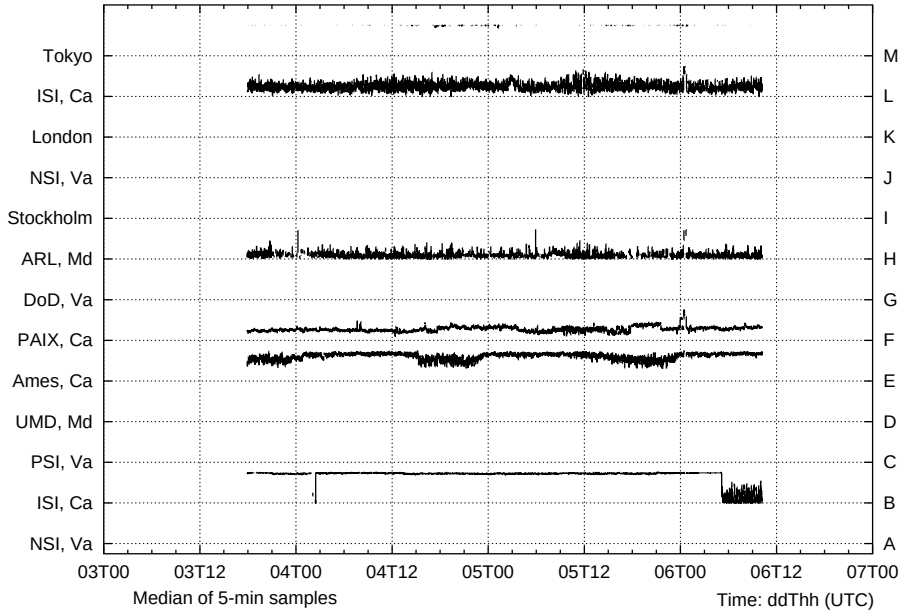


Root Servers: Observed at San Jose: Mon 3 -Thu 6 Dec 01

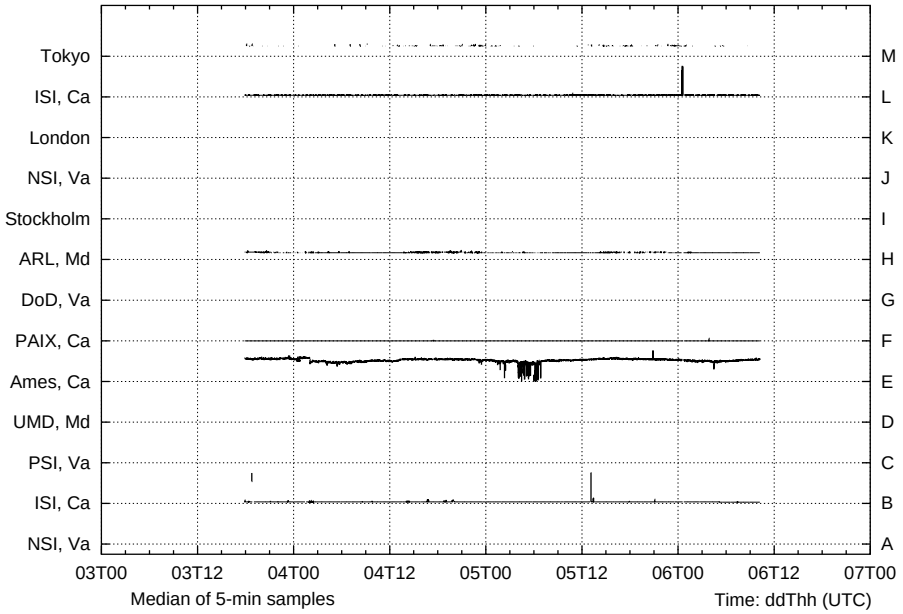
Root Requests at SJC from Mon 03 Dec 2001, scale 0-200 packets



Root Request Loss Rate at SJC from Mon 03 Dec 2001, scale 0-100 %



Root Response Time at SJC from Mon 03 Dec 2001, scale 0-300 ms



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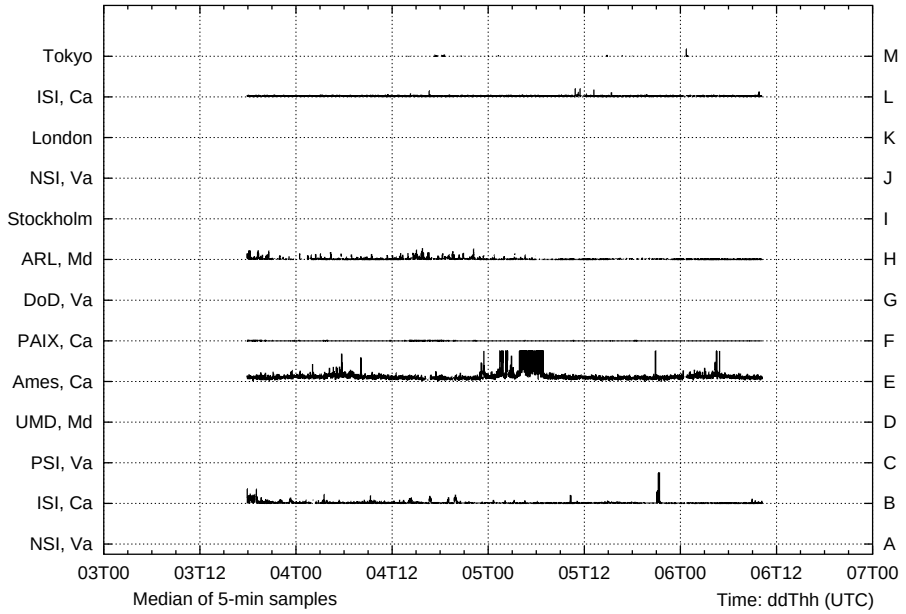

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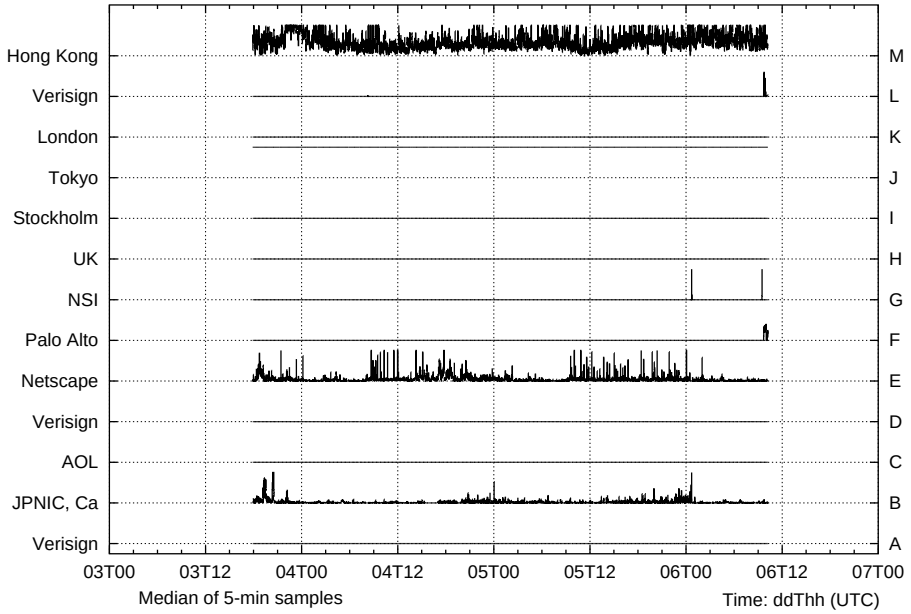

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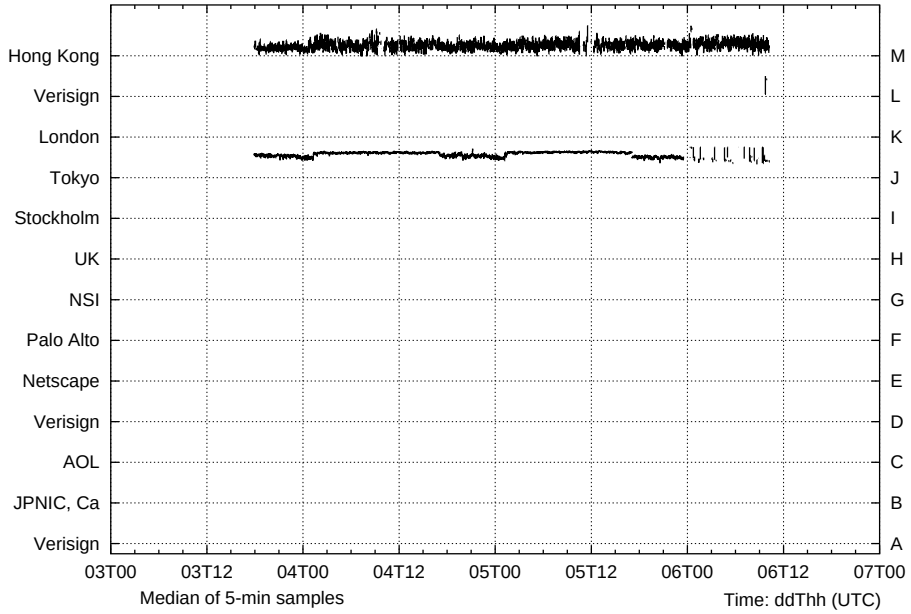

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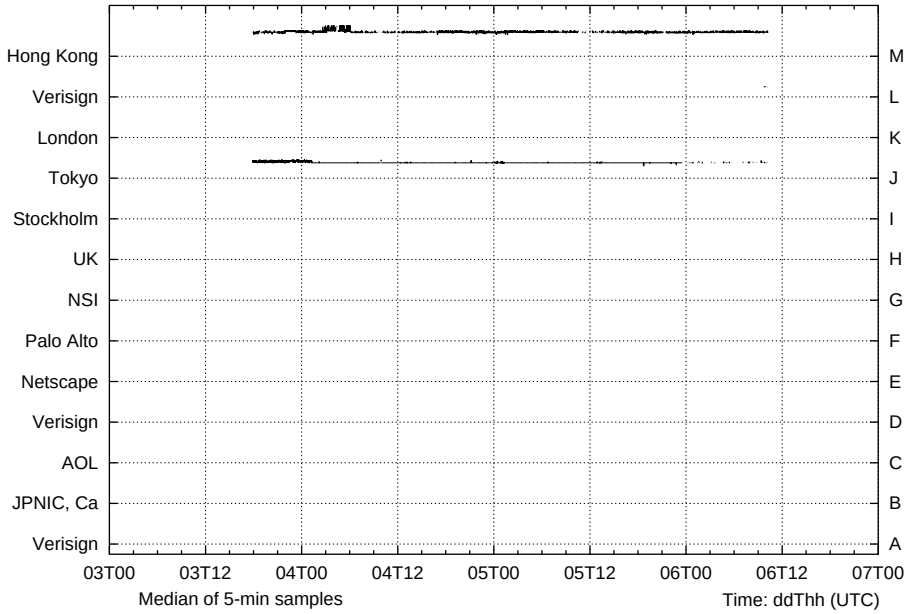

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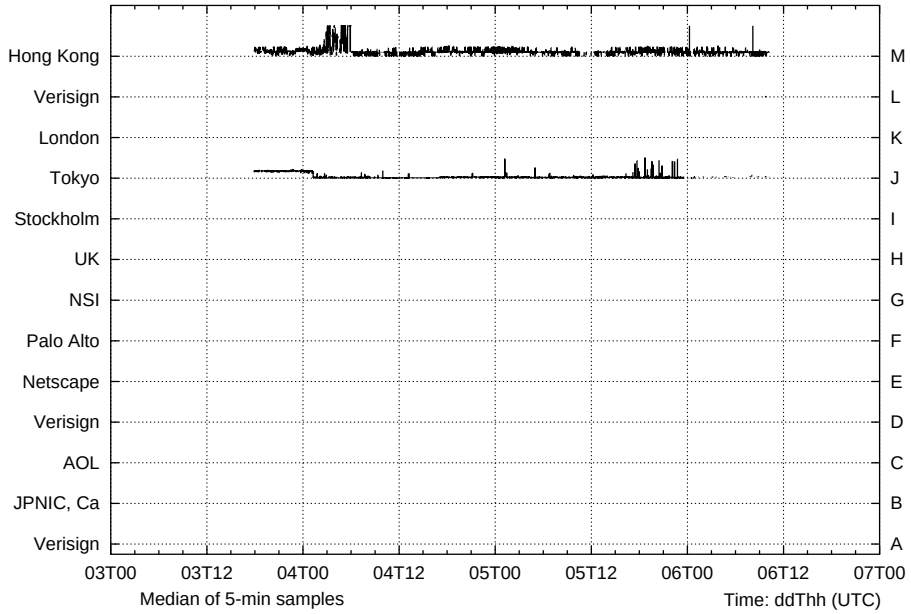

Conclusion

- As viewed from UC San Diego:
  - 9 roots perform well (A, B, D, F, H, I, J, L, M)
  - 3 do not (C, E, G)
  - 10 gTLDs perform well
  - Often see long periods of high request loss;
    these *don't* seem to affect response time
- San Jose observations are from a busy backbone link:
  - Can't measure loss rates
  - 5 roots perform well (B, F, H, L, M)
  - 1 does not (E)
  - 2 gTLDs perform well
- We need more sites to collect DNS data like this