Passive Global DNS Measurements

and

Multipathing

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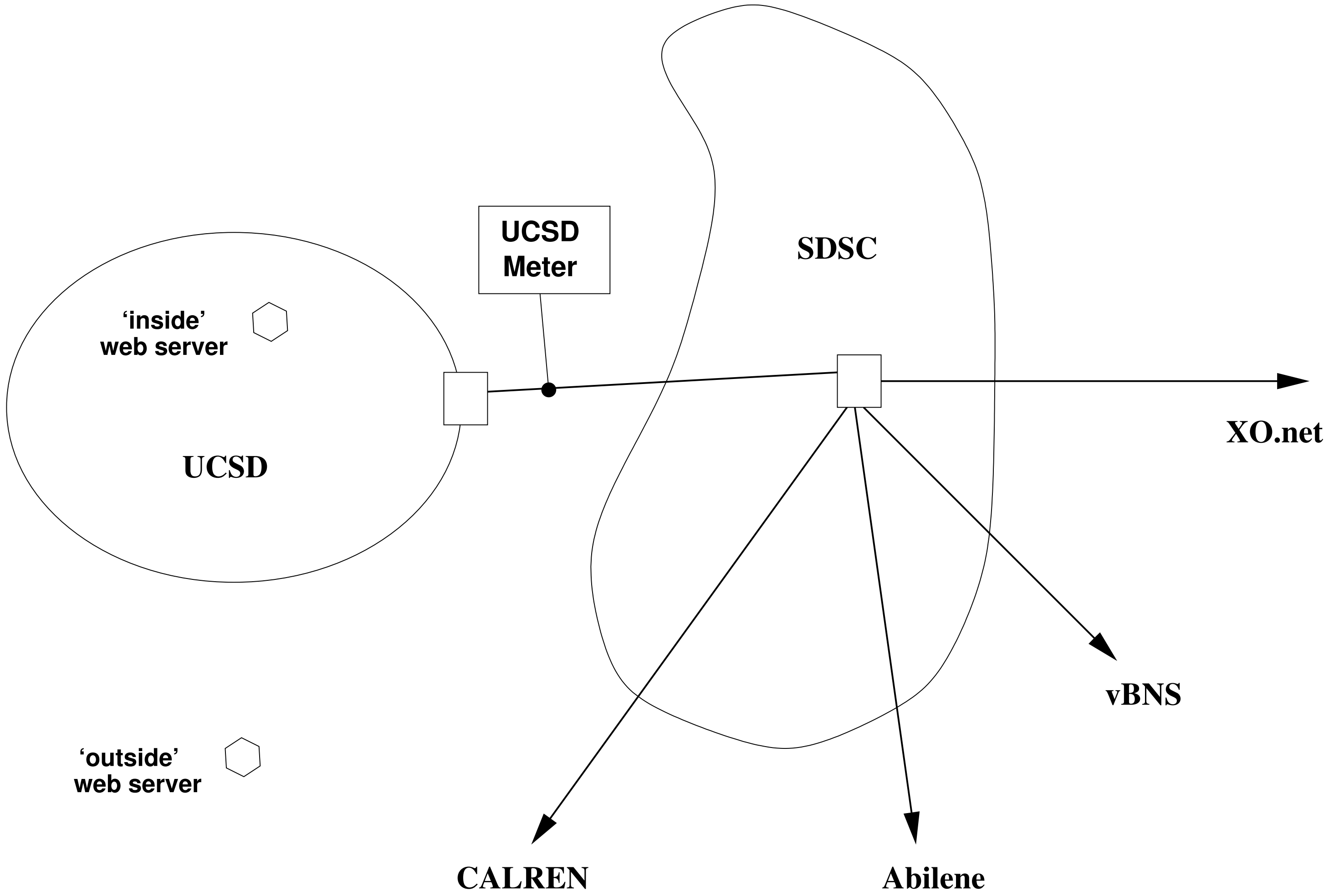
IEPG, 5 August, 2001

Introduction / Background

- We have been using NeTraMet to collect Request-Response times (RRT) for DNS queries to the global root and gTLD servers
- We use NeTraMet to collect RRT distributions over sample intervals of 5 minutes
- Data is collected on a single NeTraMet meter located at UCSD

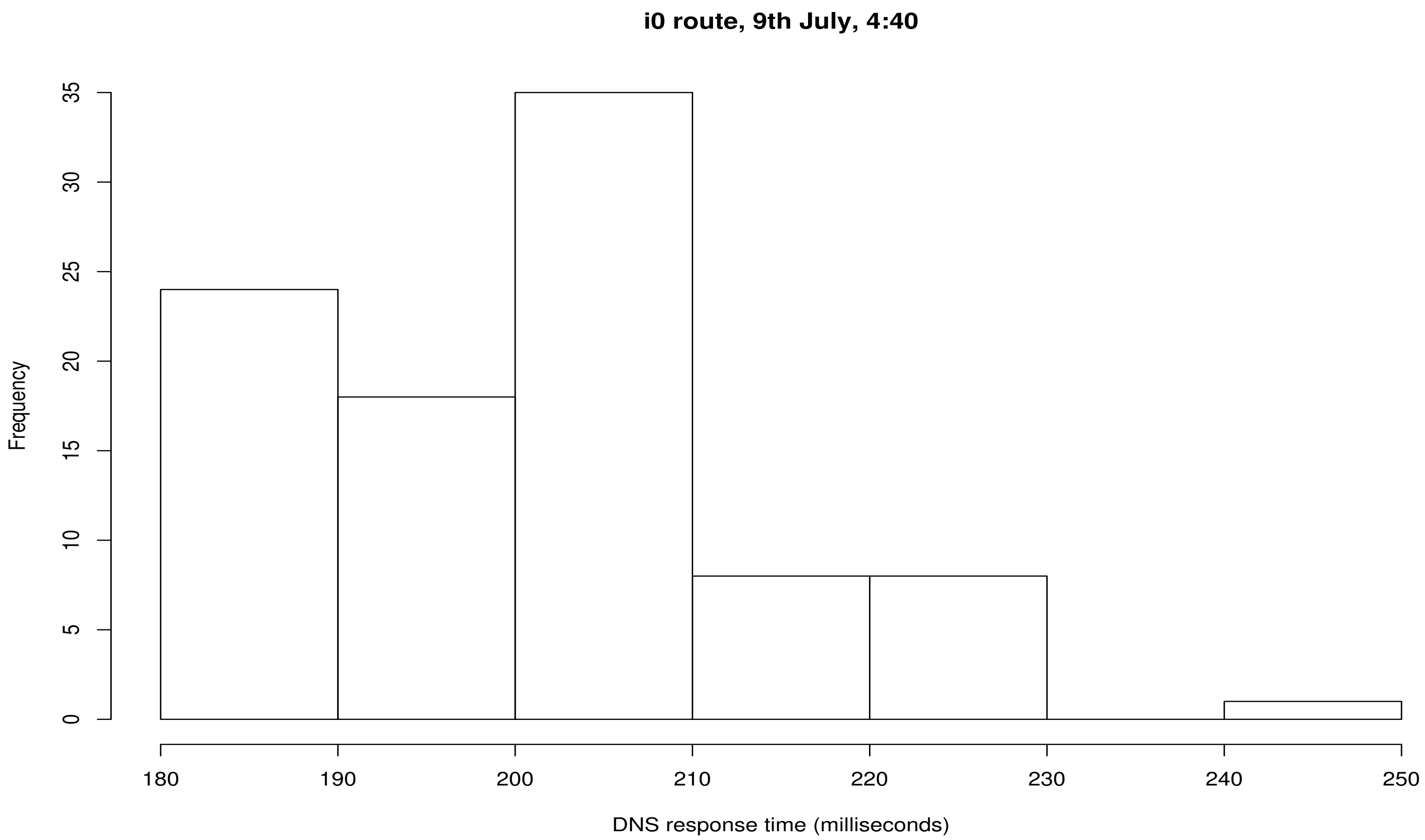
UCSD Network Topology



Collecting Distributions, or ‘Fun with Statistics’

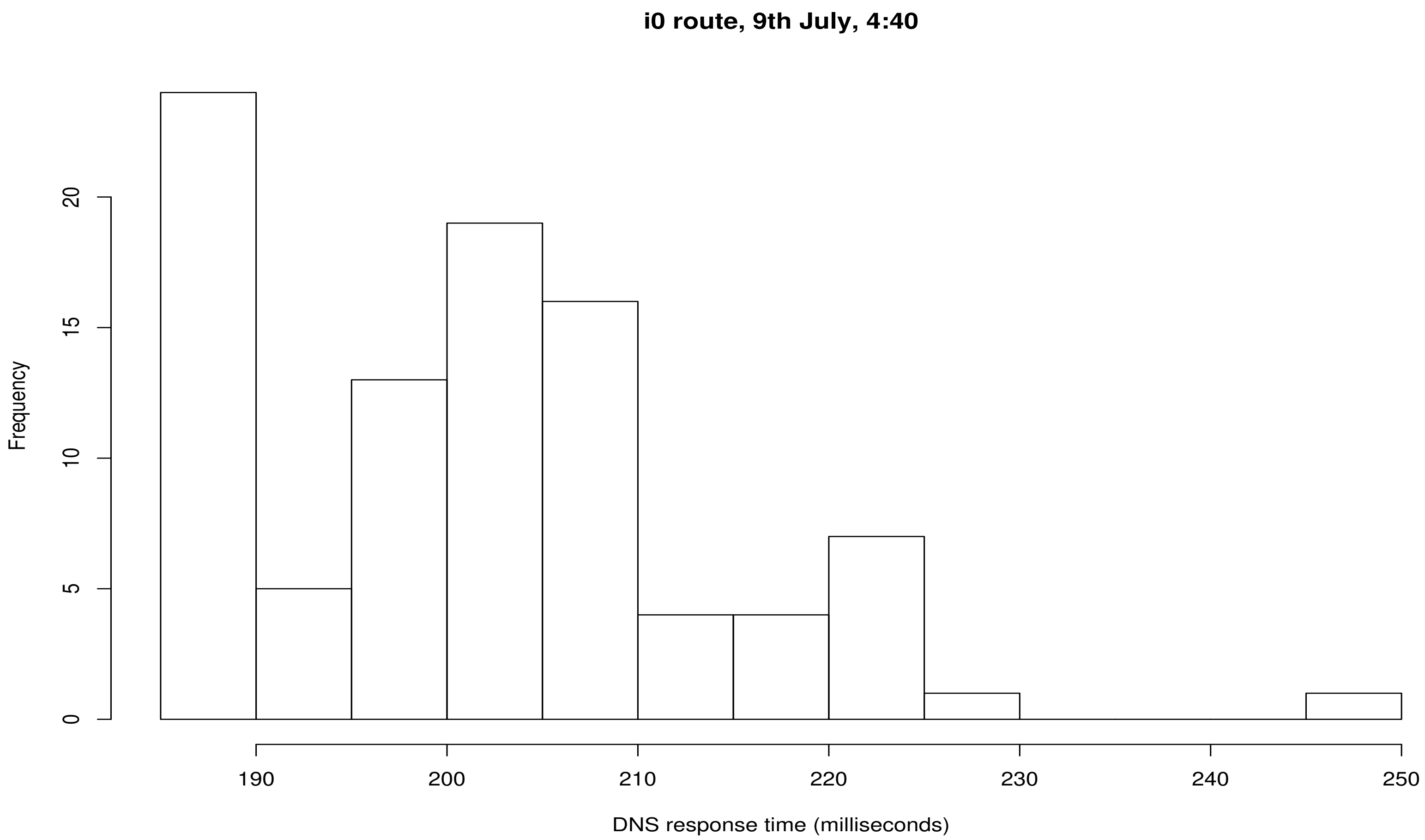
- NeTraMet (RTFM) distributions allow you to set parameters, i.e. number of bins, lower and upper bounds
- We have implemented a technique for collecting actual RRTs, for intervals with few data points (no binning required)
- We use the ‘R’ statistics package to process our data
- Next few slides are for an un-binned interval
- They show the effect of changing the number of bins

R Default: 8 Bins $\Rightarrow$ 1~2 peaks



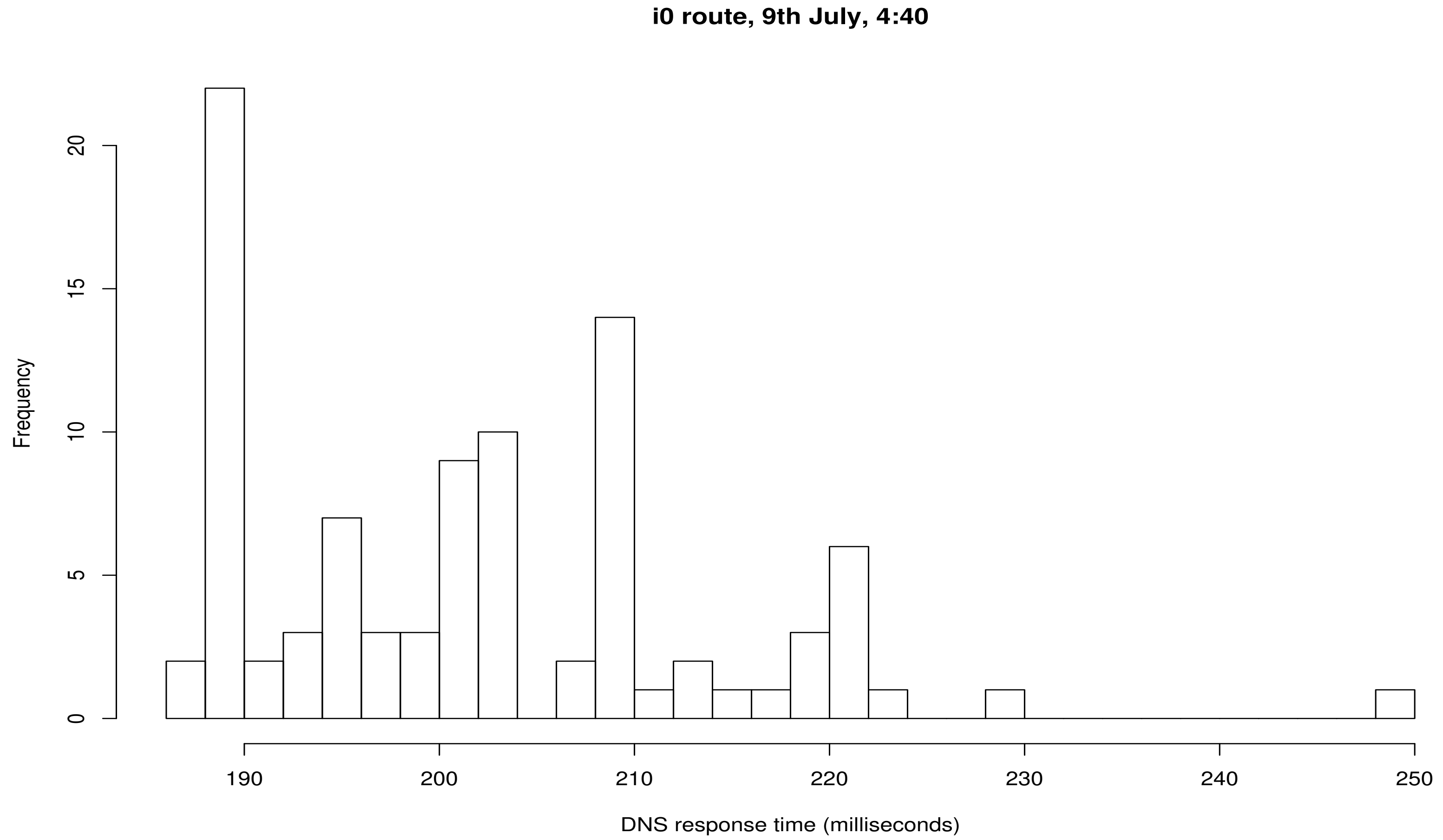
I Root, Sample ending 0440, 8 Jul 01 (UTC)

20 Bins Specified $\Rightarrow$ 3 peaks



I Root, Sample ending 0440, 8 Jul 01 (UTC)

30 Bins Specified $\Rightarrow$ 5 peaks

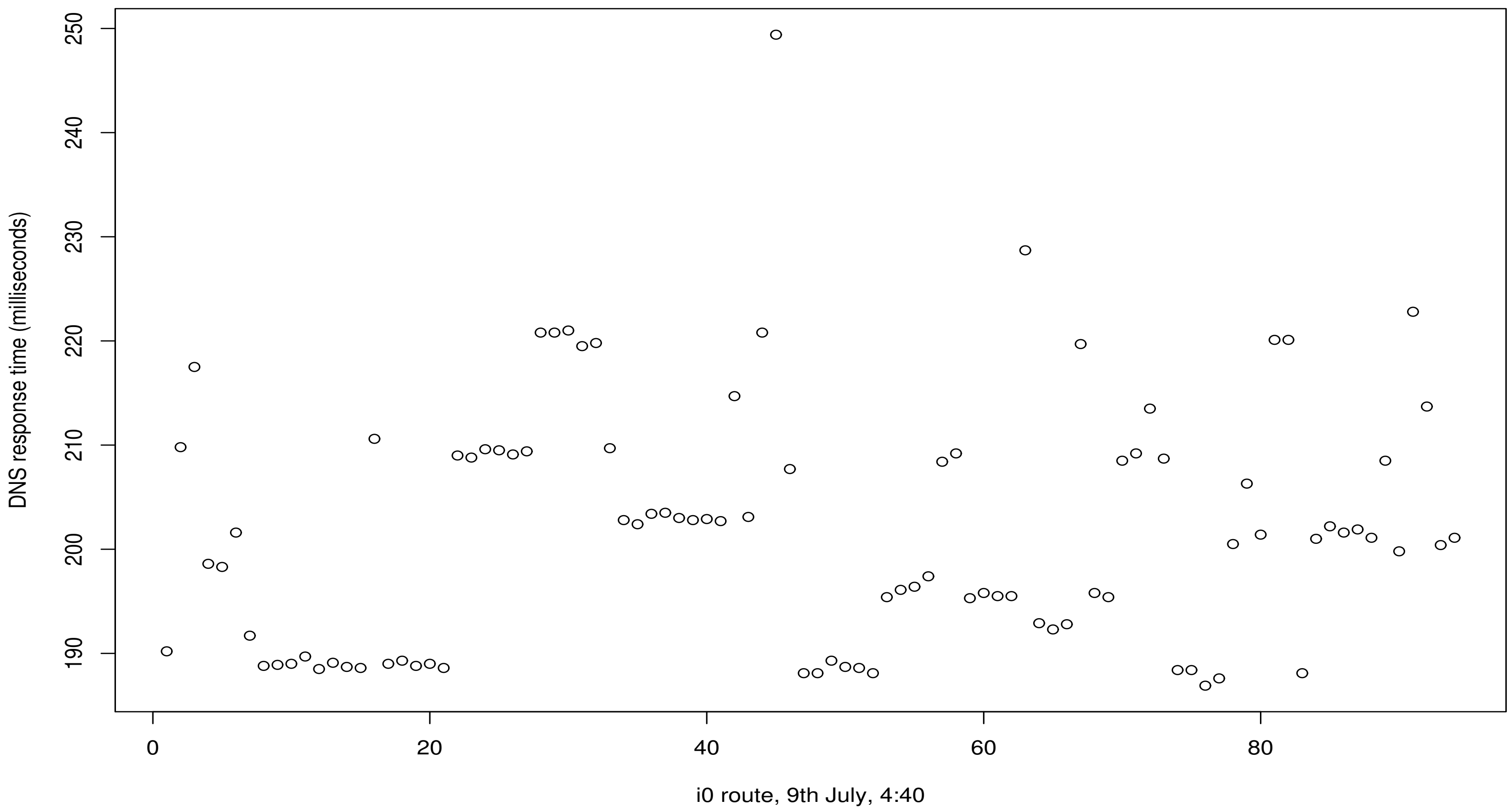


I Root, Sample ending 0440, 8 Jul 01 (UTC)

‘Actual RRT Value’ Plots

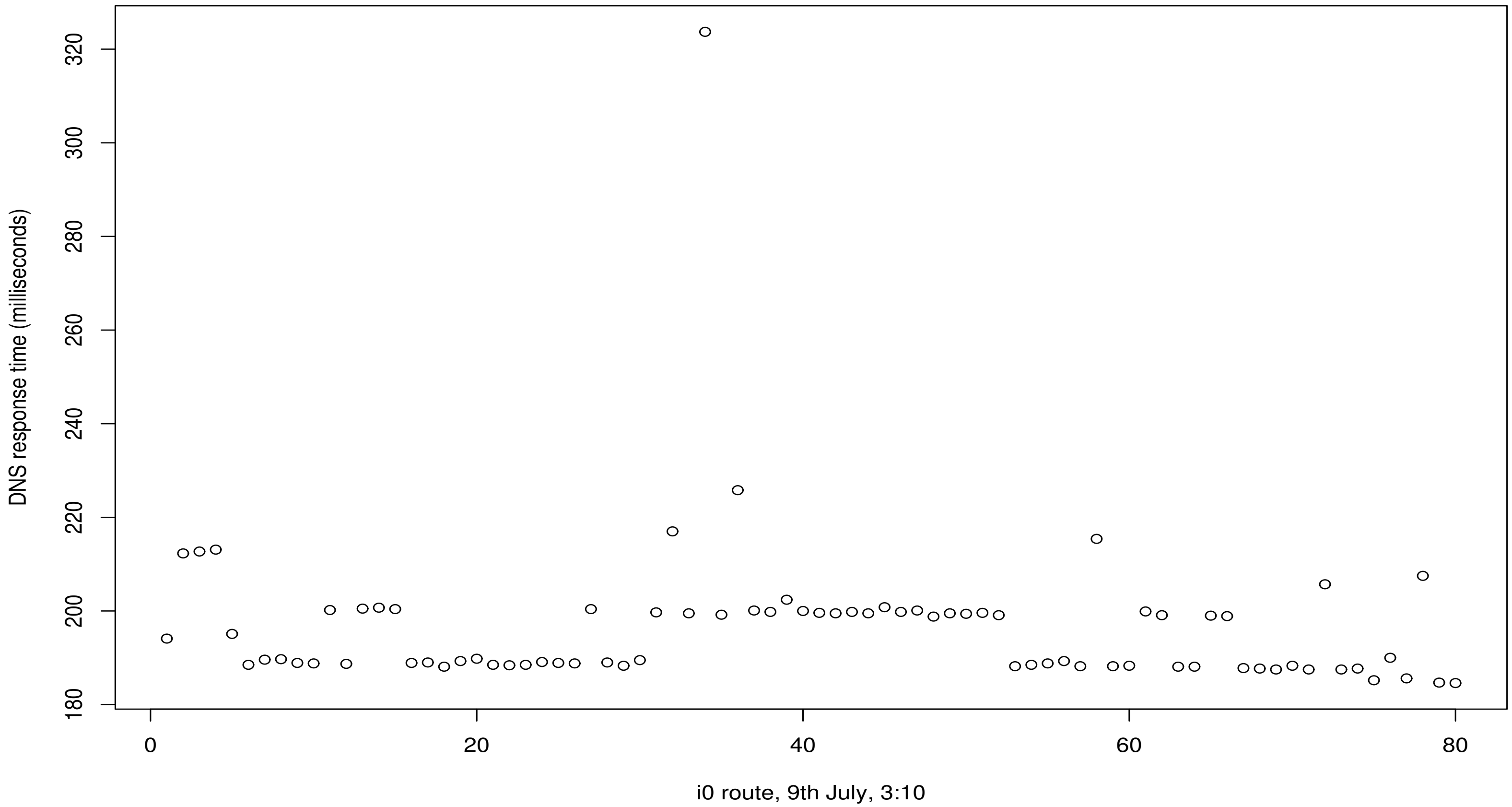
- *Increasing the number of bins beyond 30 yielded no further detail*
- Up to 100 points plotted, in arrival order
- Y axis shows Request/Response time in ms
- X axis shows points in sequence
- These *aren’t* time series plots (no timestamps recorded)

I Root RRT, Sample 629 (used for histograms)



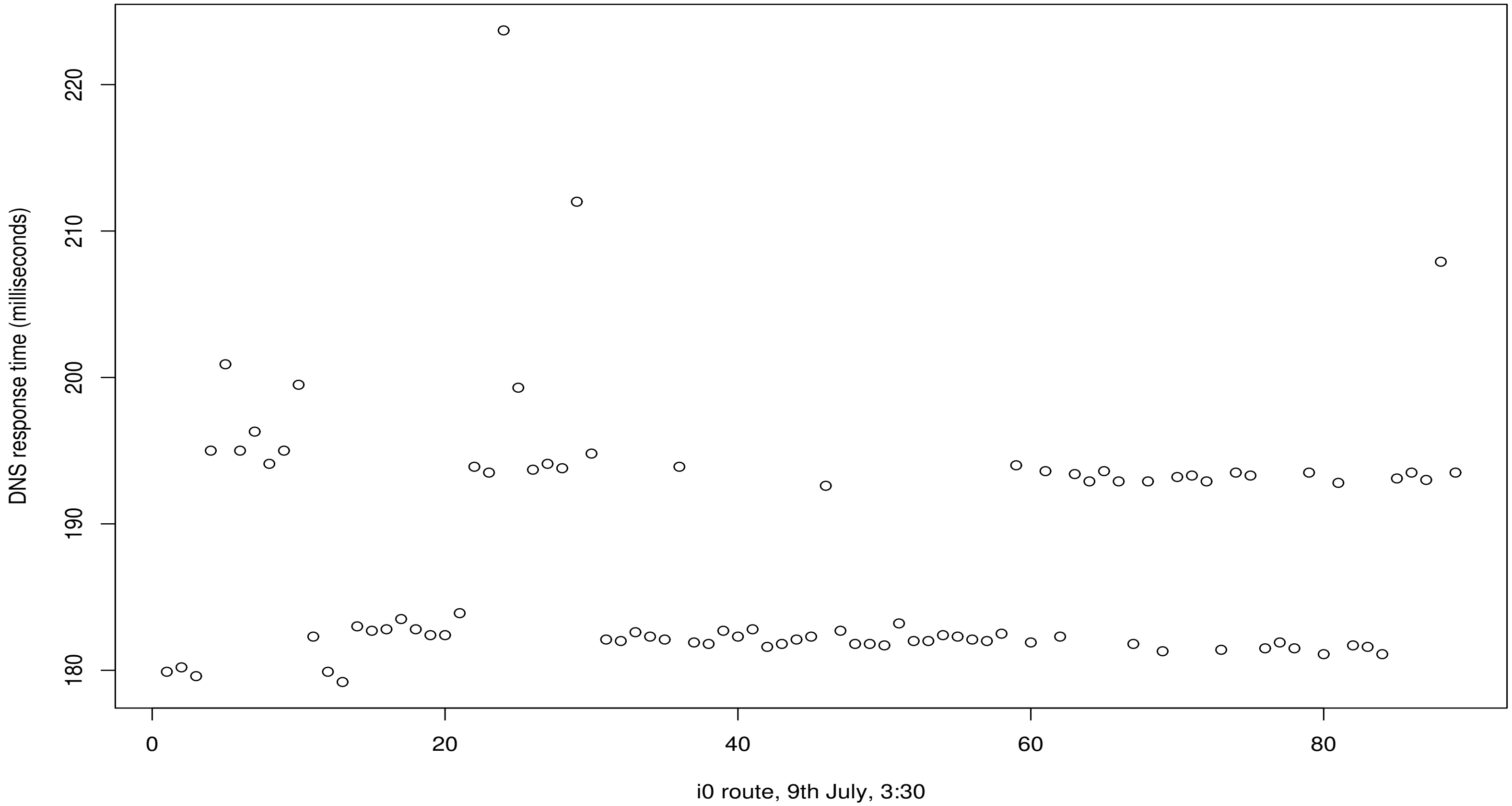
I Root, Sample ending 0440, 8 Jul 01 (UTC)

I Root Request/Response Time, Sample 354



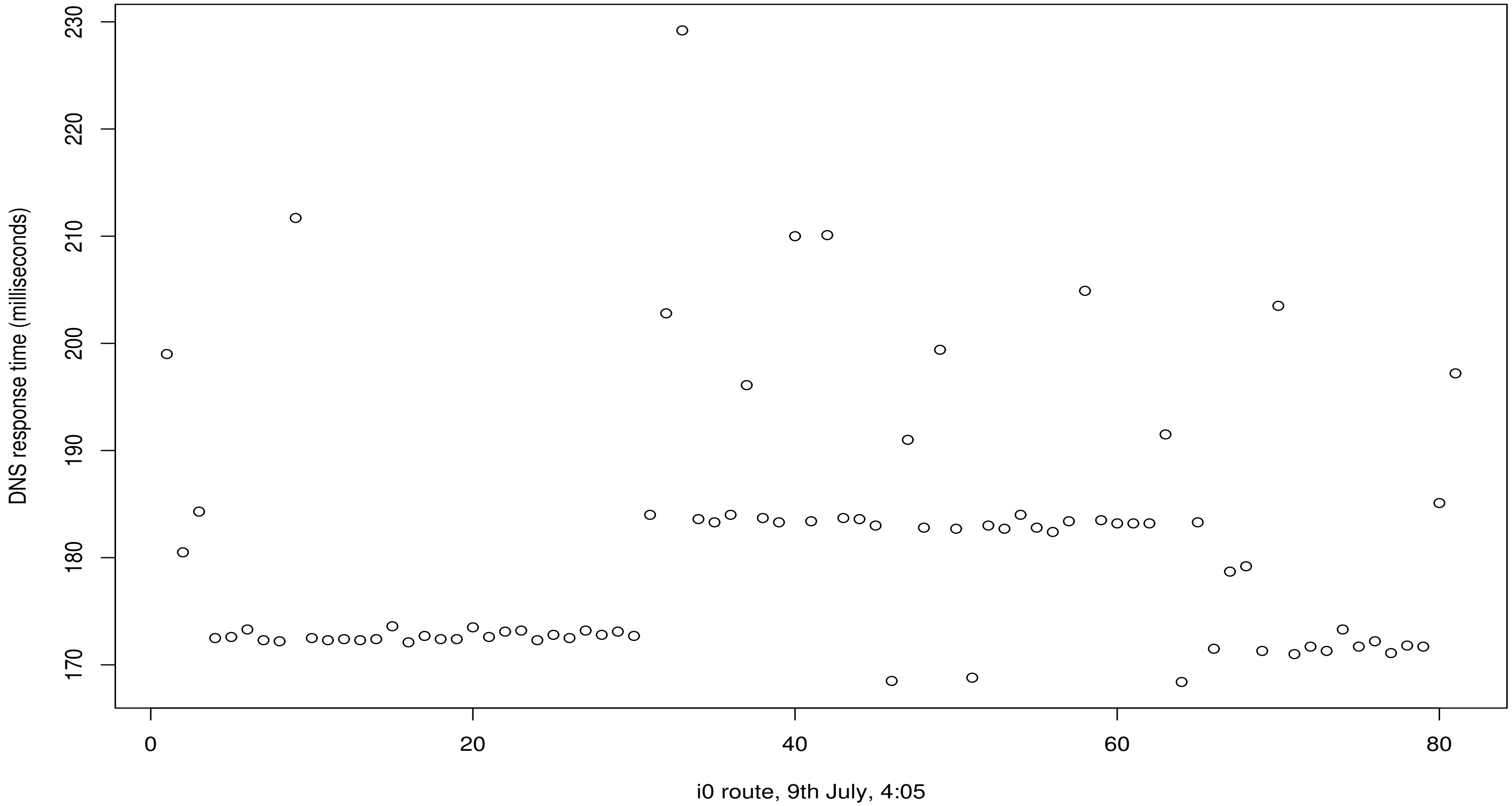
I Root, Sample ending 0310, 8 Jul 01 (UTC)

I Root Request/Response Time, Sample 416



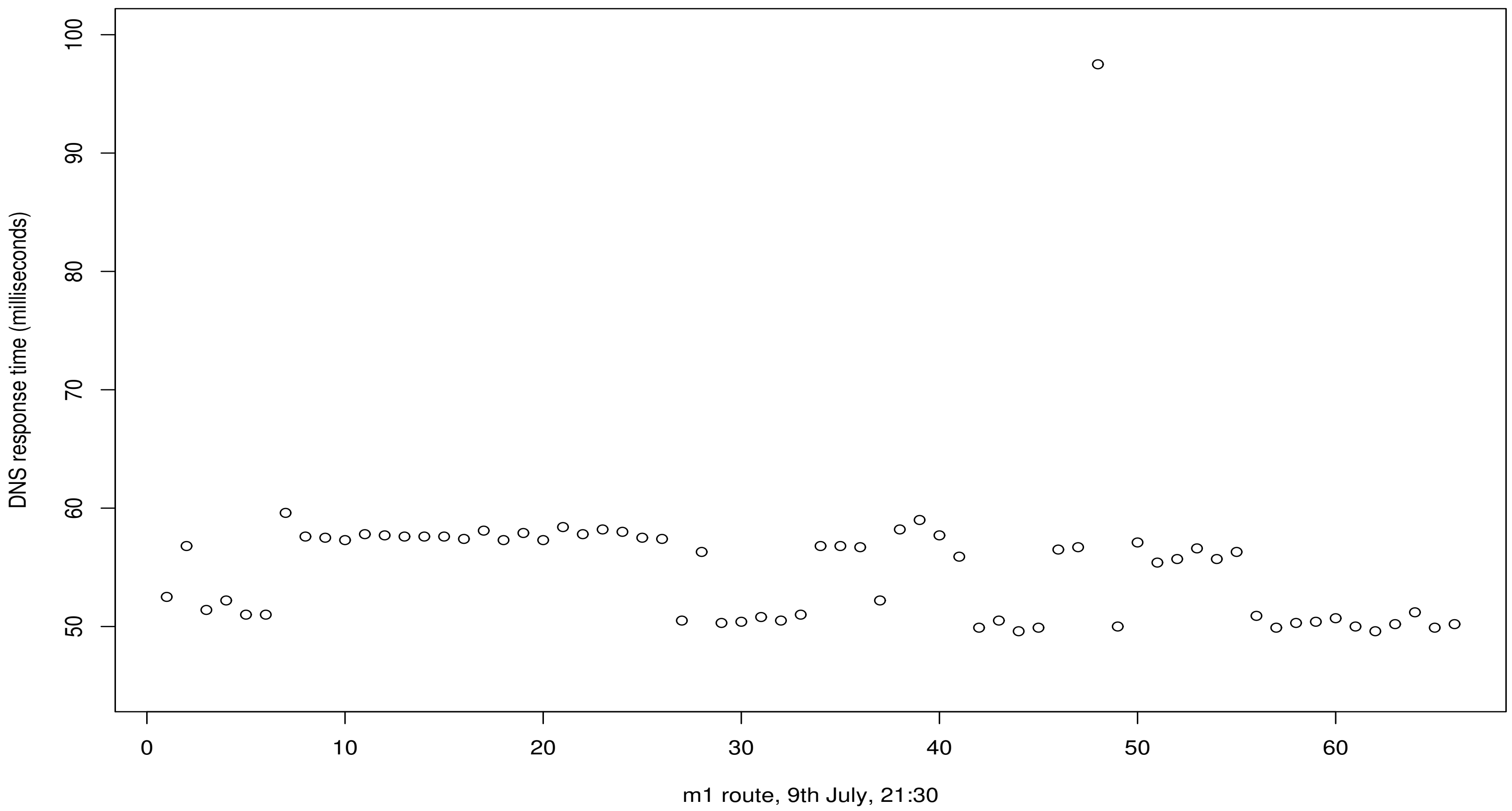
I Root, Sample ending 0330, 8 Jul 01 (UTC)

I Root Request/Response Time, Sample 534



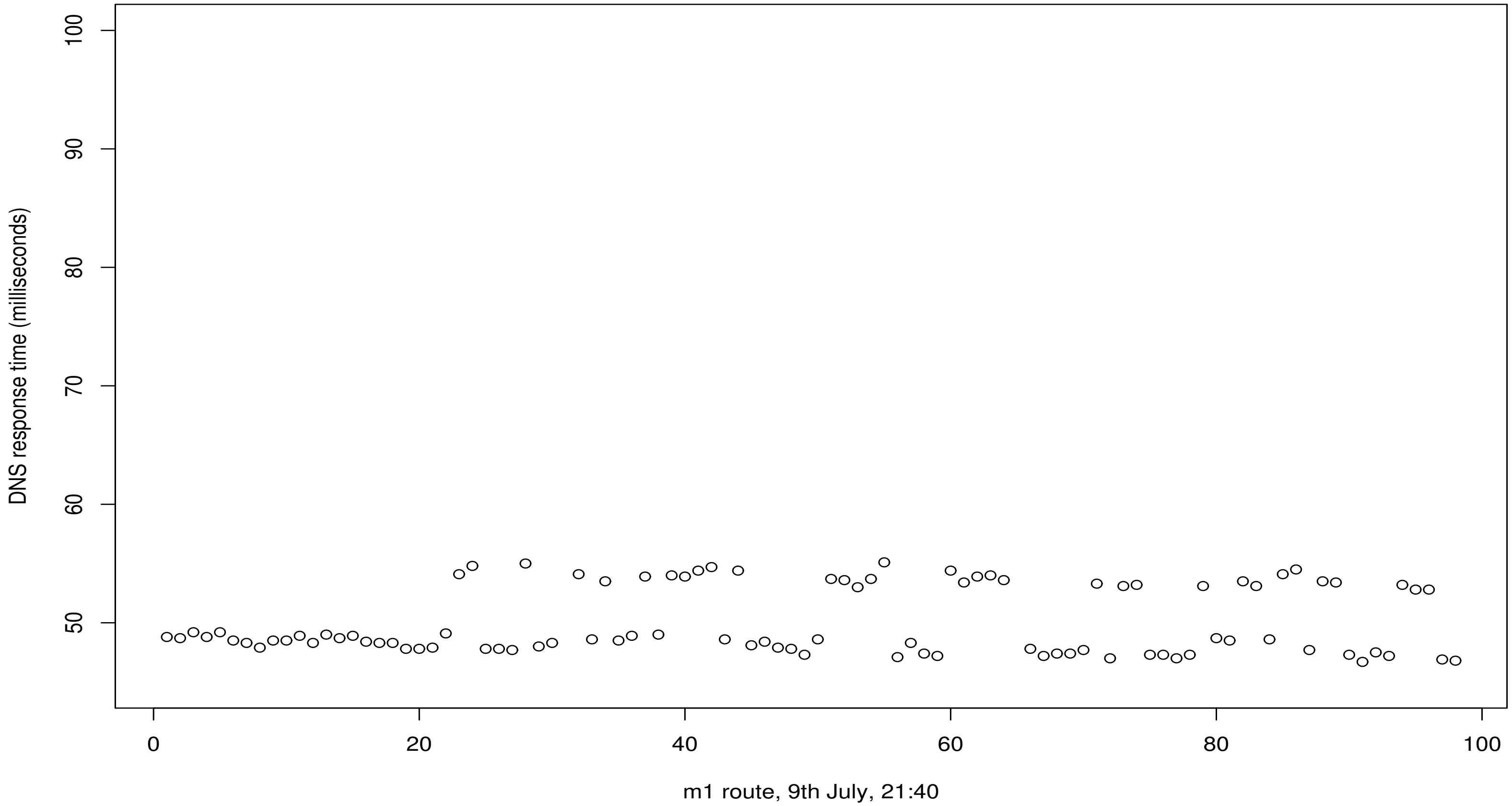
I Root, Sample ending 0405, 8 Jul 01 (UTC)

M gTLD Request/Response Time, Sample 12722



M gTLD, Sample ending 2130, 8 Jul 01 (UTC)

M gTLD Request/Response Time, Sample 12735



M gTLD, Sample ending 2140, 8 Jul 01 (UTC)

Summary

- We often see intervals with several ‘preferred’ RRT values
- RRT swaps back and forth, making 5~10 transitions between preferred values in a 5-minute sample interval
- This is too short to be caused by BGP route flaps
- It’s too irregular to be caused by configured load balancing

So ...

- Clearly packets are taking one of several different paths
- But why? Can anyone suggest an explanation?

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