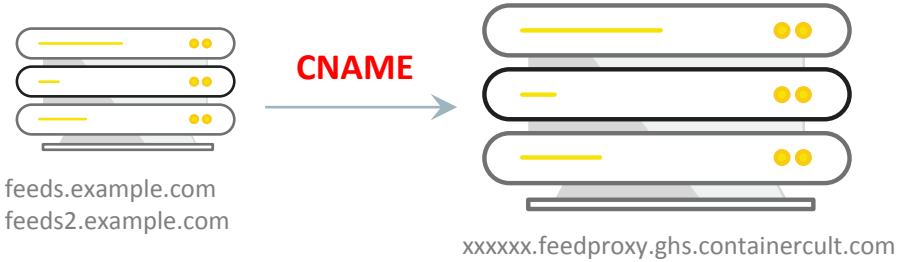
ORACLE + Dyn

CNAME Chain Latency vs. ALIAS / ANAME

How to Use Alias Records to Improve CNAME Flattening Performance

What Is a CNAME?



- Defined in RFC 1035 as “the **canonical name** for an alias”
- It means “that name is really this other name”
- Nothing else (including SOA, the zone apex) can exist at a CNAME

Why a CNAME?

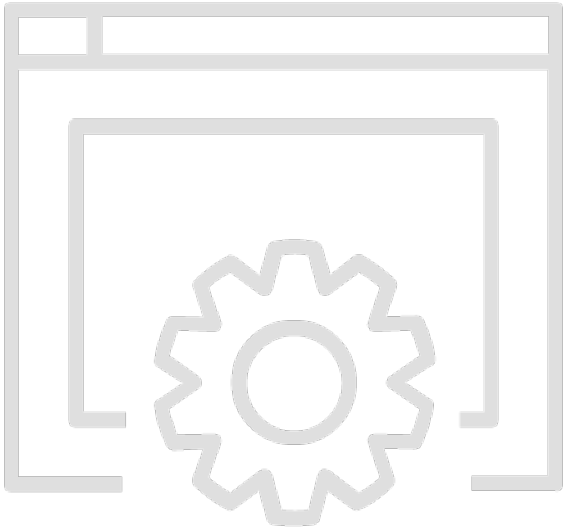
One use is to **let someone else manage something**.

Example: Cloud provider resource

- www.dyn.com → loadbalancer.example.com
- Cloud provider manages IP resources behind the scenes ensures the address associated with the CNAME is available

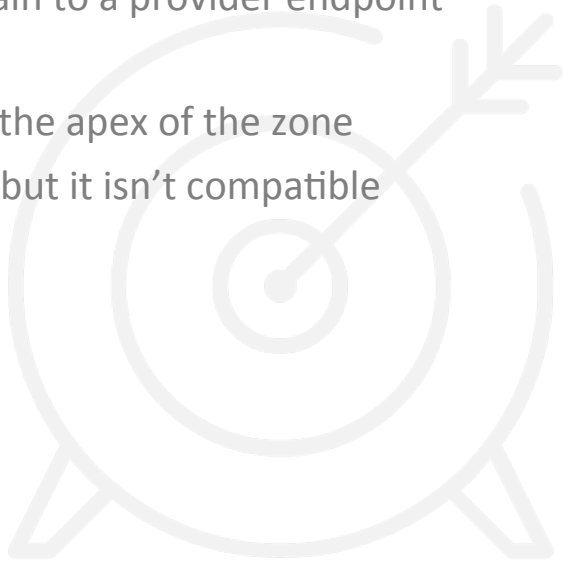
Example: marketing automation platform

- marketing.dyn.com → market-site.example.com
- Marketing automation company can do all they want inside market-site.example.com, and it just shows up on marketing.dyn.com



CNAME at the Apex

- Users want to configure their domain to be completely hosted by someone else
- The first instinct is to put a CNAME at the apex to map the domain to a provider endpoint
- By definition a CNAME can’t coexist with any other records type
- You need to have SOA (Start of Authority) records in the apex of the zone
- ALIAS records provide the functionality of a CNAME at the apex but it isn’t compatible



Performance Implications of CNAMEs

Example

marketing.dyn.com IN CNAME market-site.example.com
market-site.example.com IN A 192.0.2.10
The cost of this abstraction is another DNS query

- The client needs to request marketing.dyn.com
- Then request market-site.example.com

Cloud-era CNAME Chains

- Cloud providers often offer service endpoints in the form of CNAMEs
  Cloud load balancers, compute resources, databases … etc.

- What are the performance considerations as chains of CNAMEs get longer?

www.containercult.net.	60	IN	CNAME	www-containercult-com.wafservice.com.
www-containercult-com.wafservice.com	300	IN	CNAME	control.wafservice.com.
control.wafservice.com.	120	IN	CNAME	endpoint-cloud-vip.wafservice.com.
endpoint-cloud-vip.wafservice.com.	3600	IN	CNAME	loadbalancer1337.cloudregion.lb.cloudprovider.io.
loadbalancer1337.cloudregion.lb.cloudprovider.io.	60	IN	A 192.0.2.50	

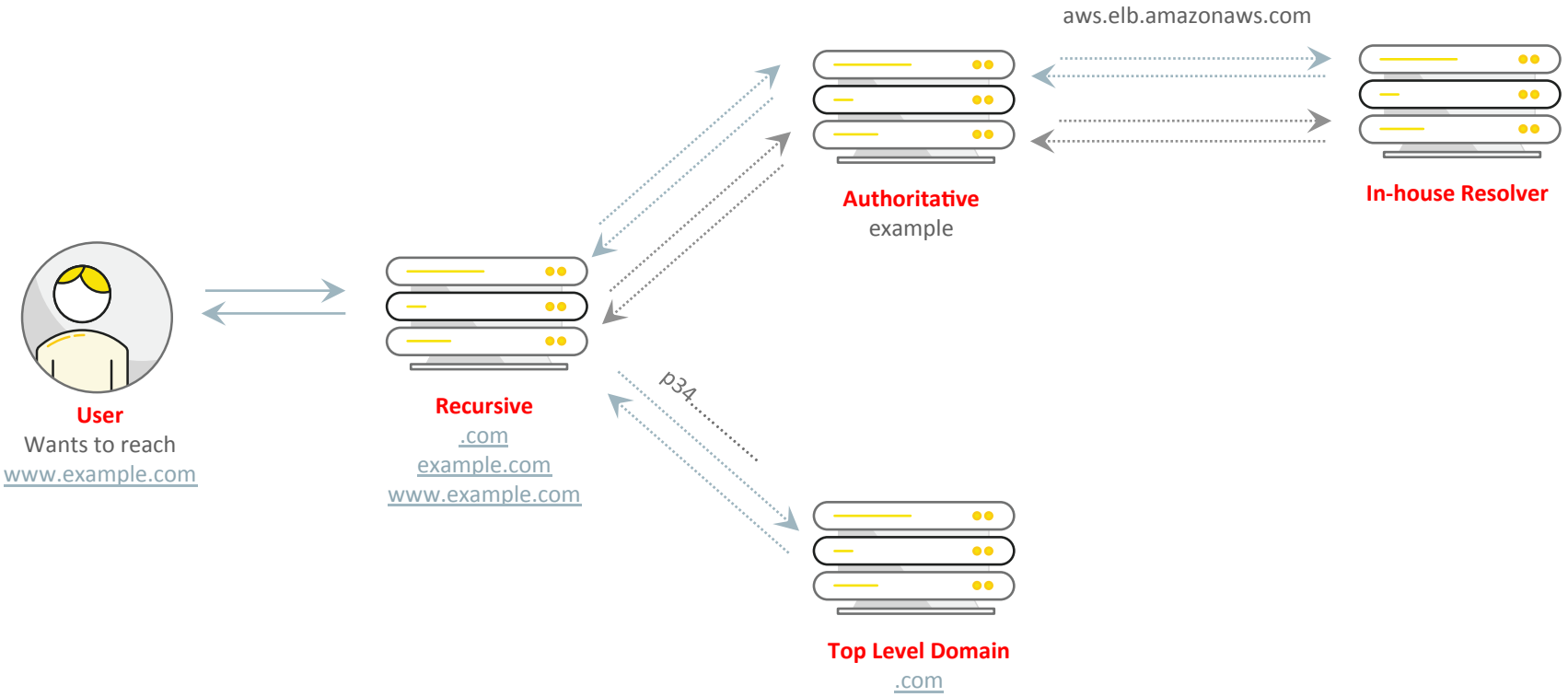
The Cost of Vanity...

A number of services implement a “vanity CNAME” to hide the fact that the customer is not doing everything itself.

Remember that no one should ever see these...

http://thefineartdiner.blogspot.com/2012/03/walt-disney-brothers-grimm-comparative.html

CNAME Unwinding as a Service



Understanding Variables

End User/ Client

Recursive Resolver

- TTL/Cache size/Pre-Caching

Authoritative Resolver(s)

Networks

- Client to recursive resolver
- Recursive resolver to authoritative resolvers

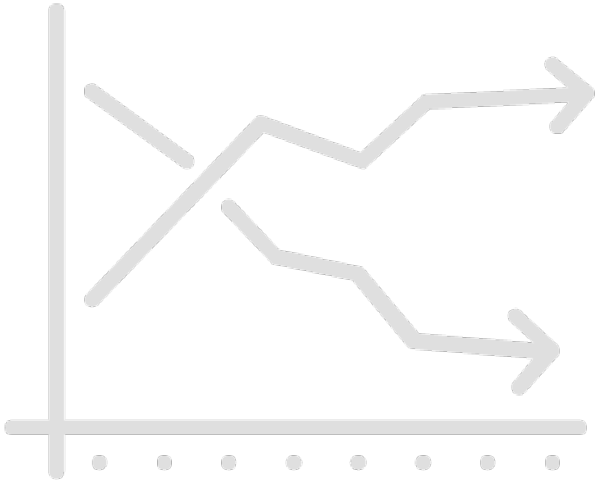
Testing ALIAS Addressing Variables

End User/Clients/Recursive Resolvers

- Test sample locations based on current top querying networks and RIPE Atlas Probe availability

- Looking at the probes choice of resolver

  This will show the performance of using Google Public DNS or ISP recursive resolvers

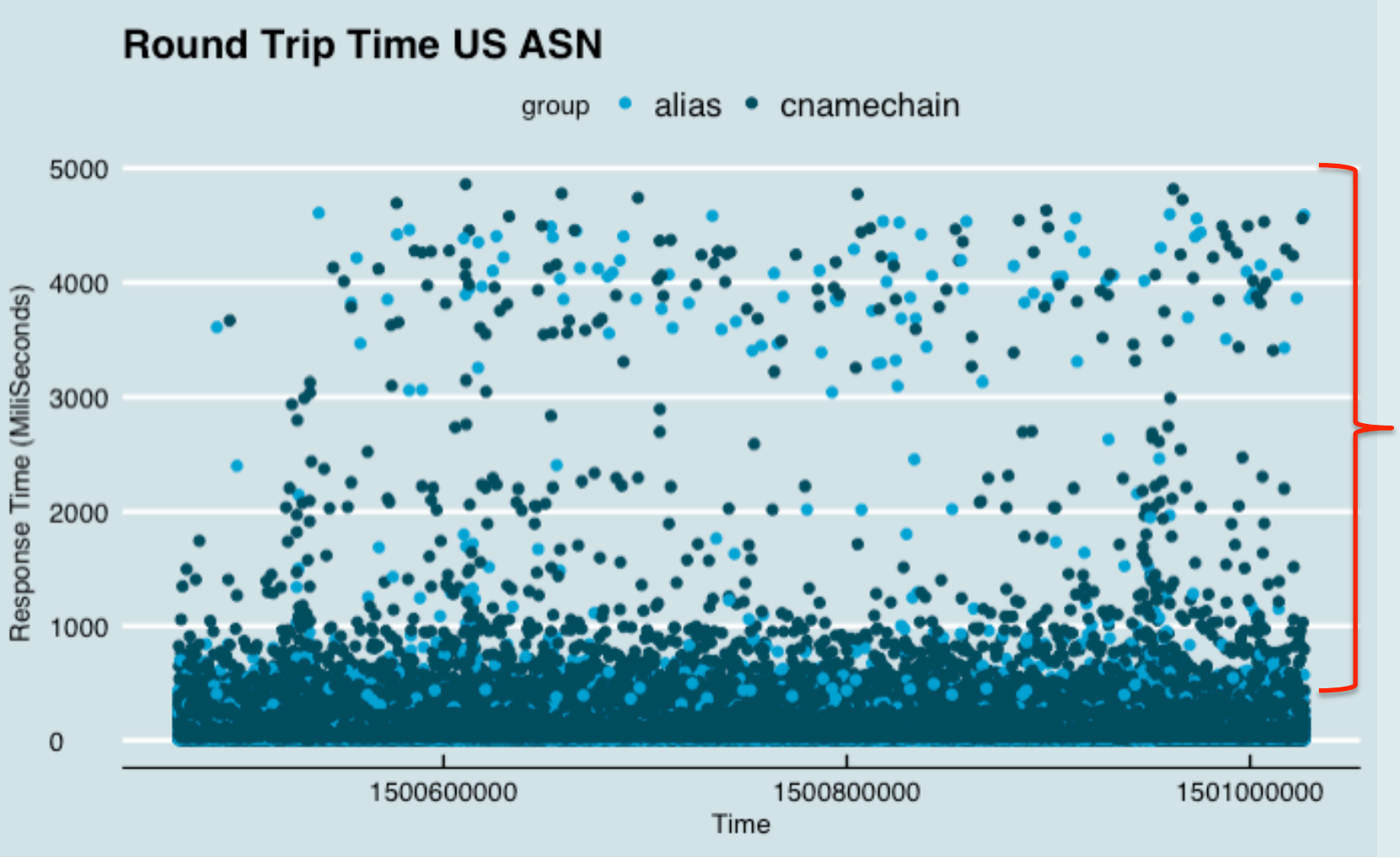


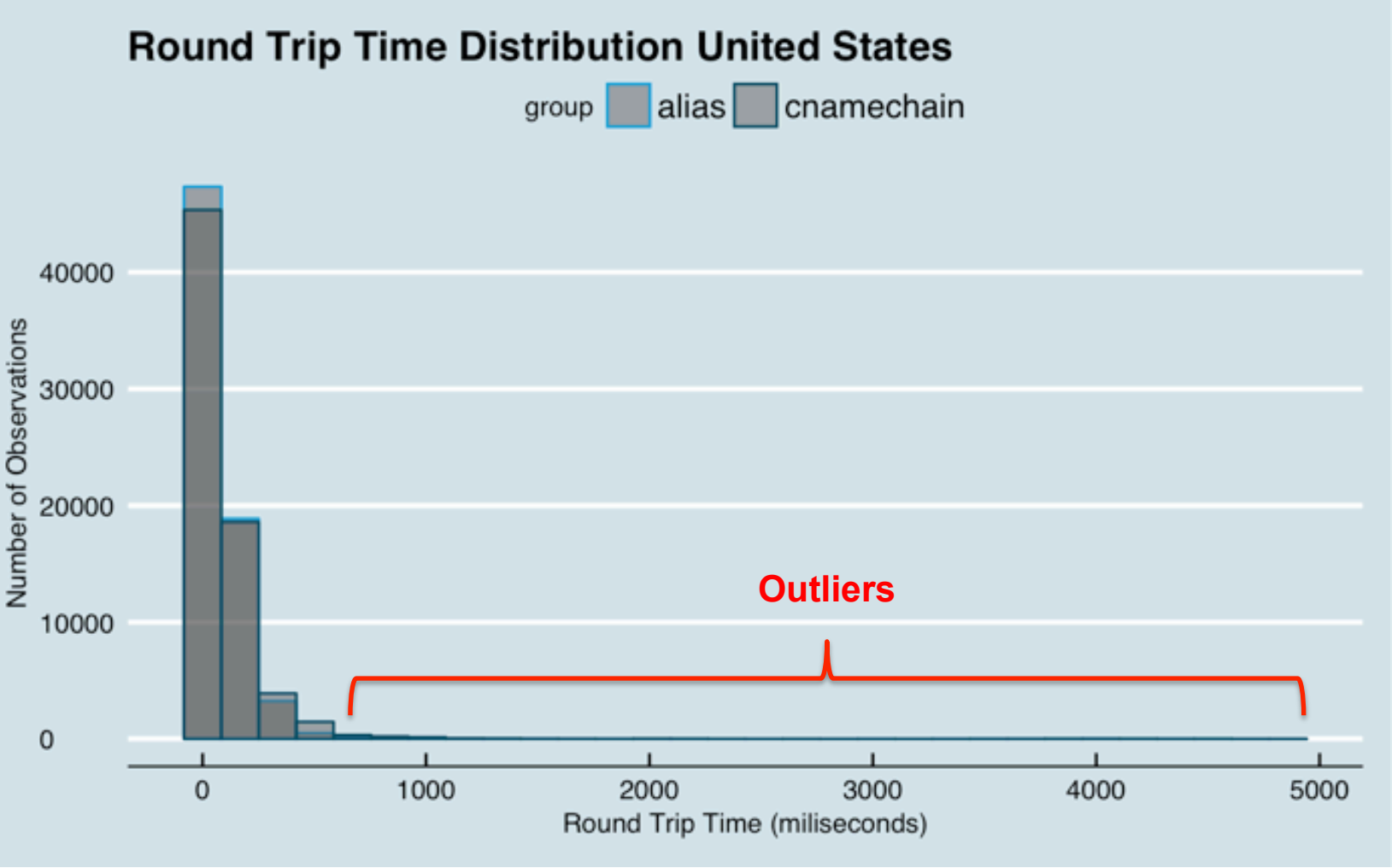
Measurement and Quantification

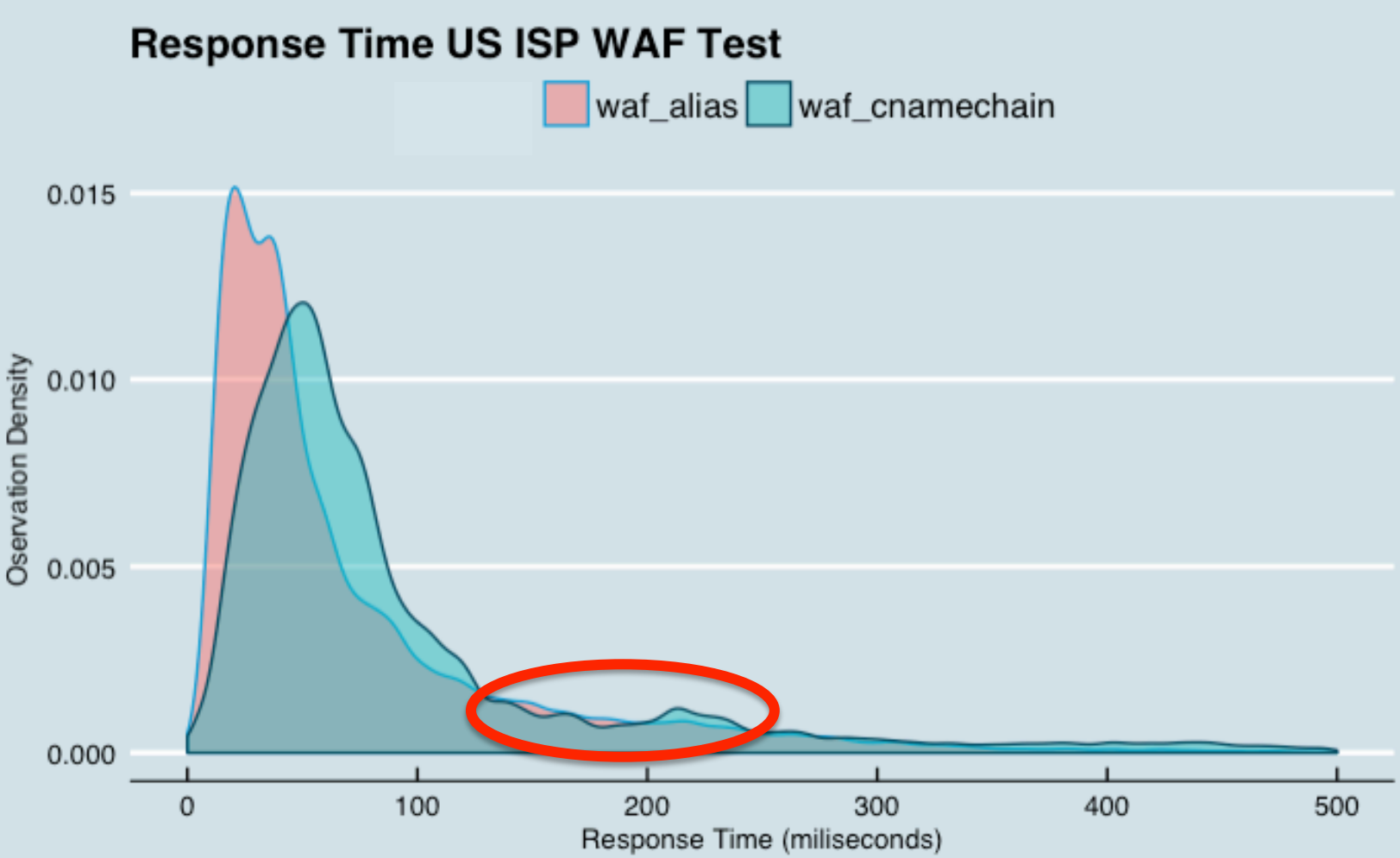
Two scenarios 1 CNAME and 5 CNAMES
The count of the question asked **doesn't** *clarify the impact to performance.*

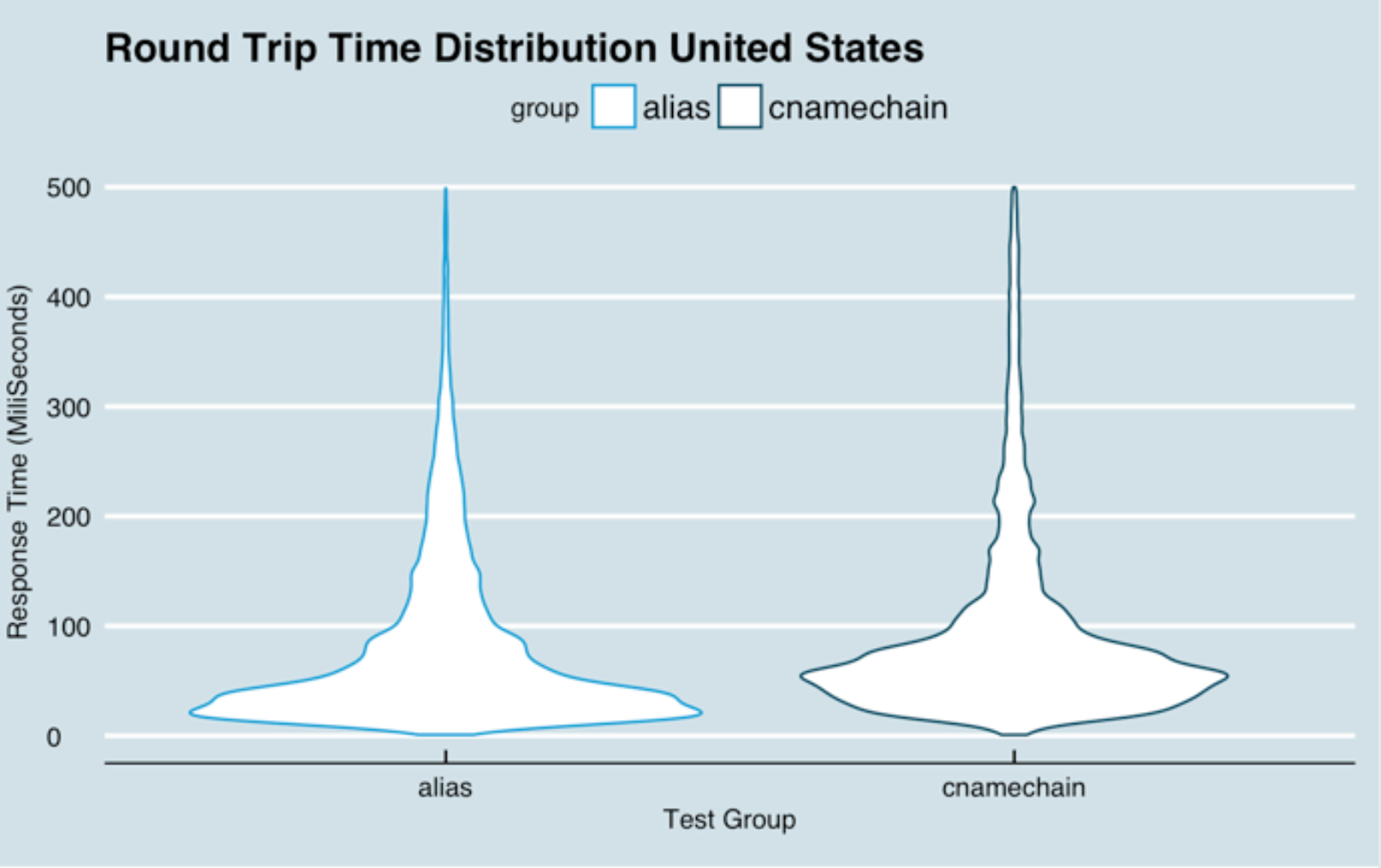
Spoiler: "The median response for the service which uses 5 CNAMES 63.18 ms vs. the ALIAS record 44.96 ms, a difference of 18.22 ms"

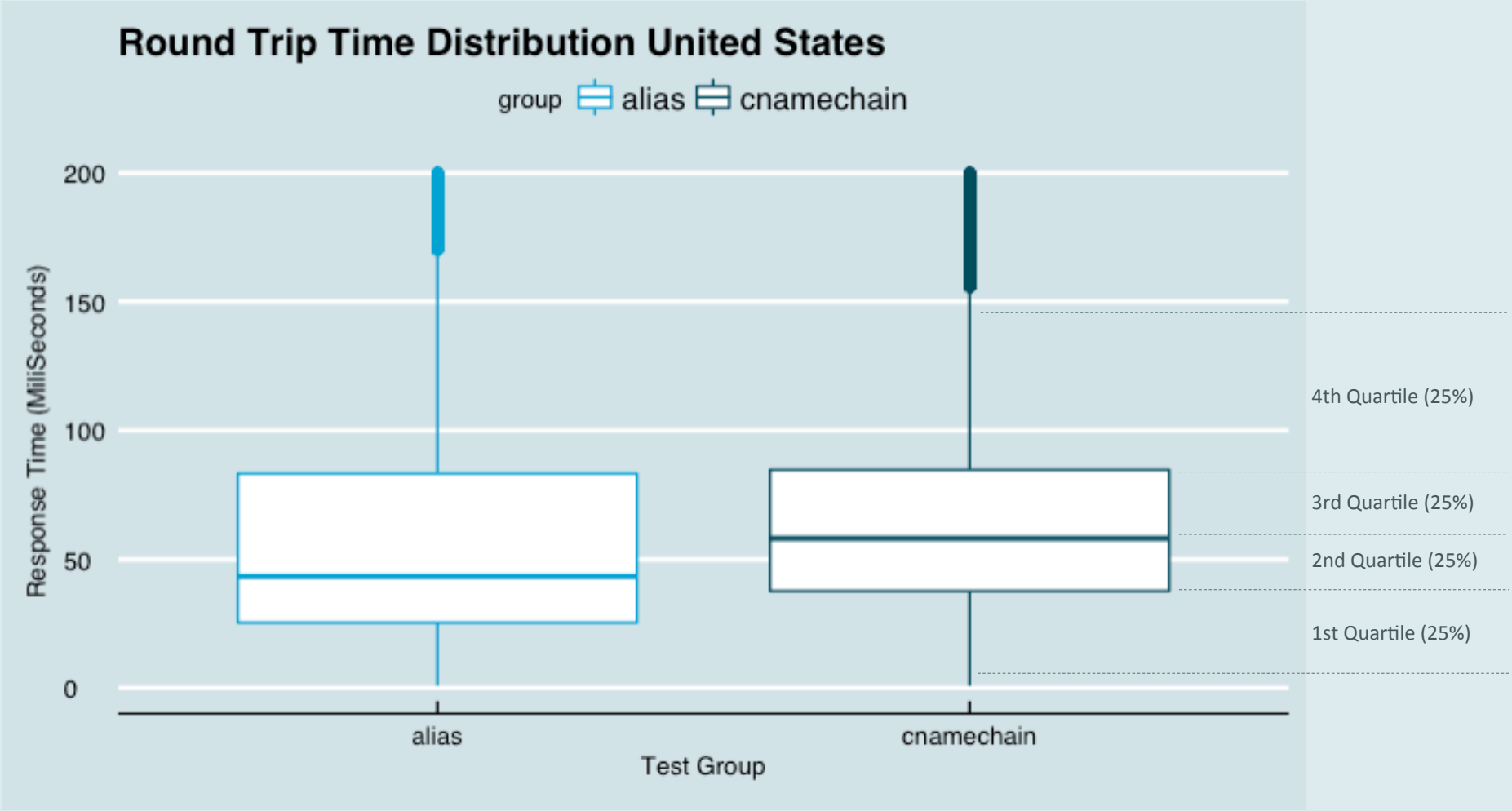
This is a start...but given the number of variables involved it might help to look at the specific network to understand the dynamics.

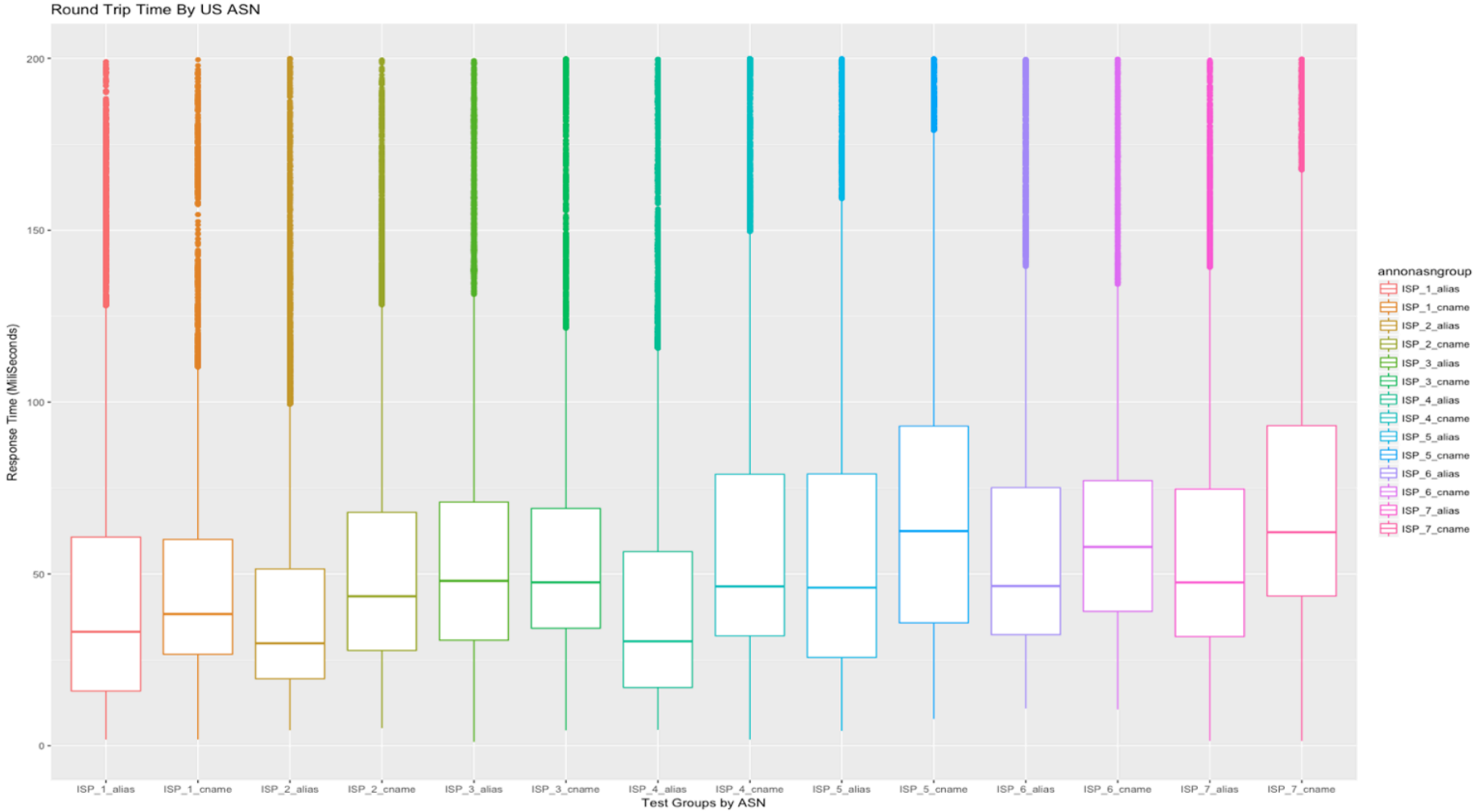


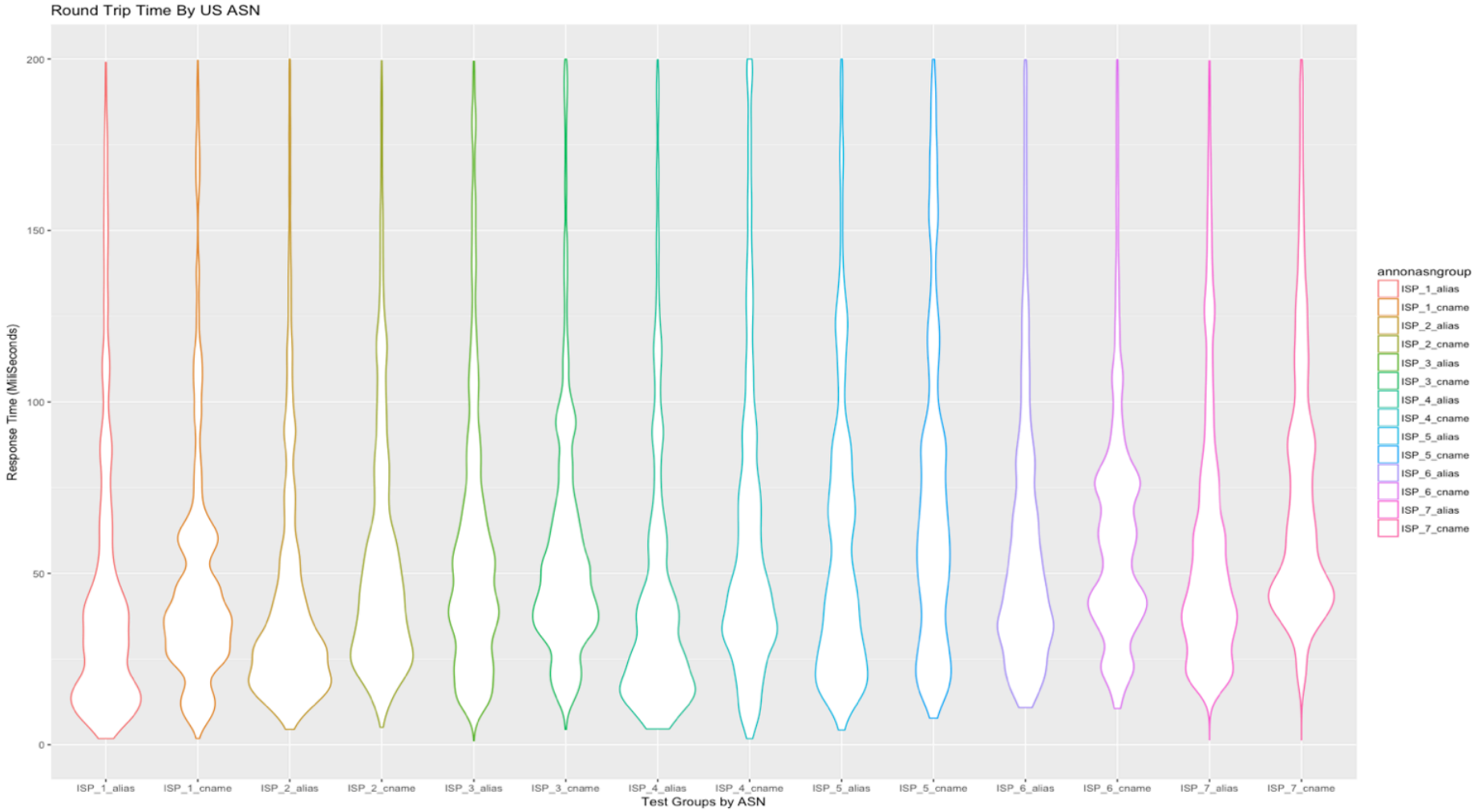












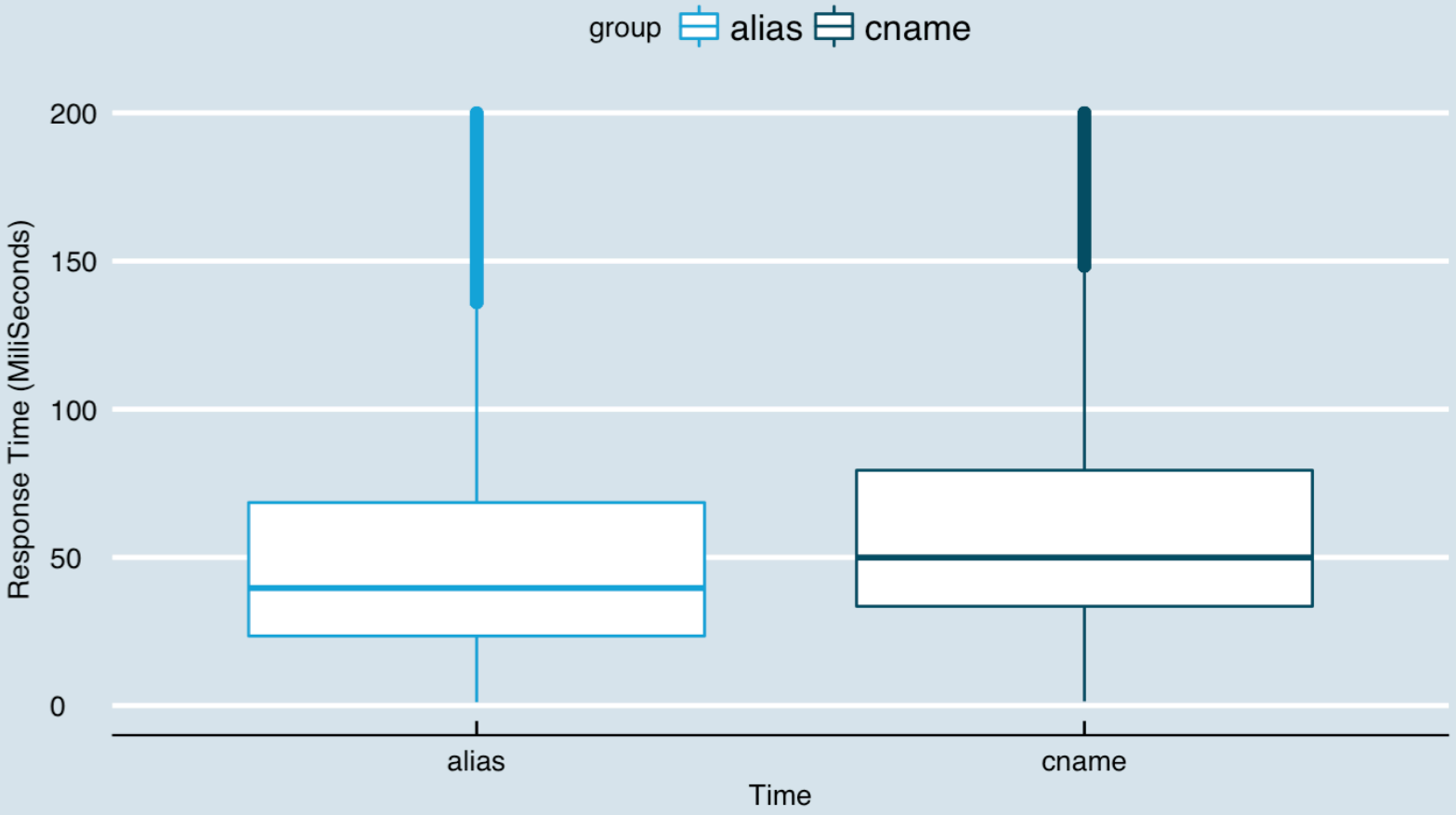
Compressing Short CNAME Chains

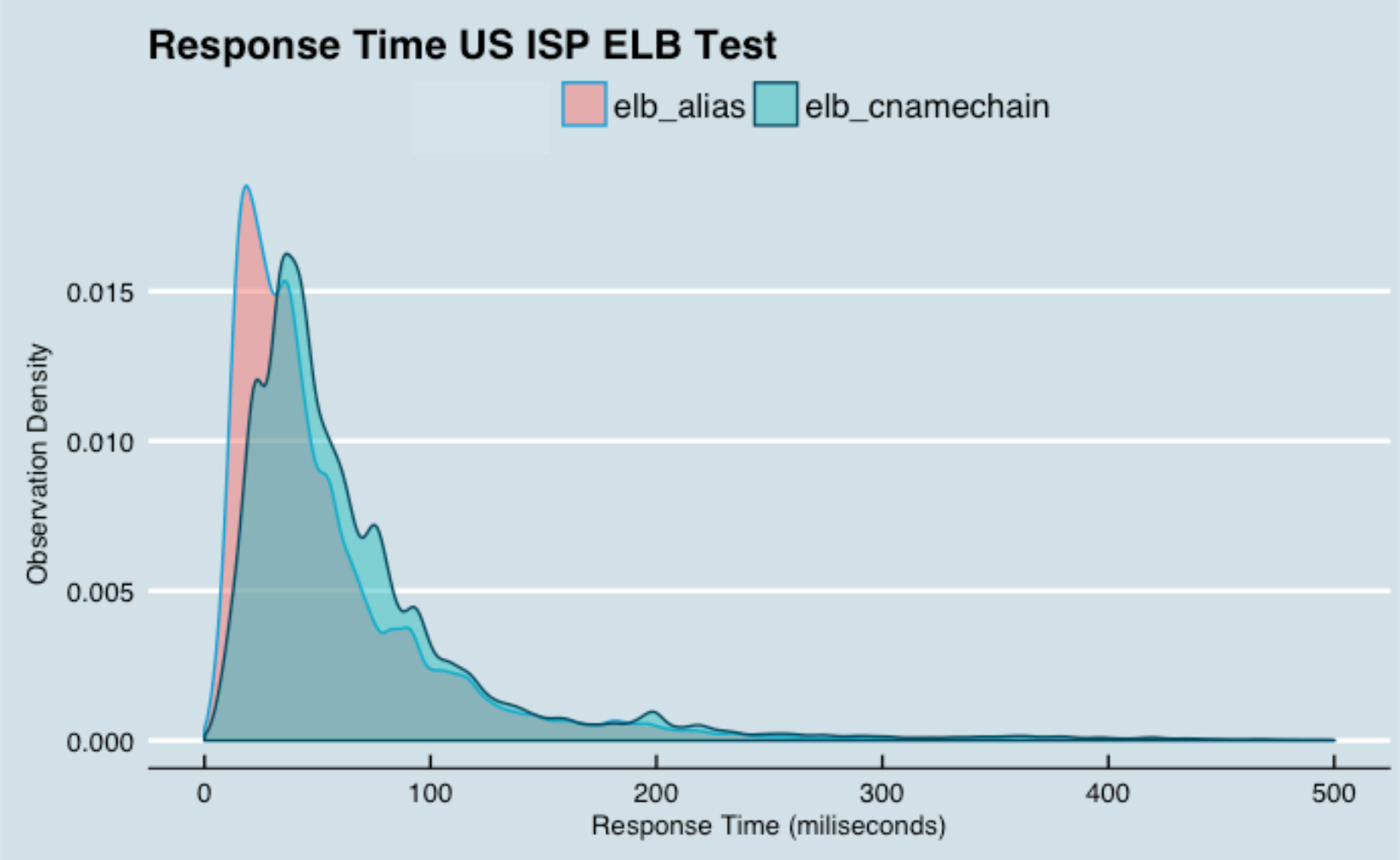
ALIAS vs. CNAME for Cloud Load Balancer

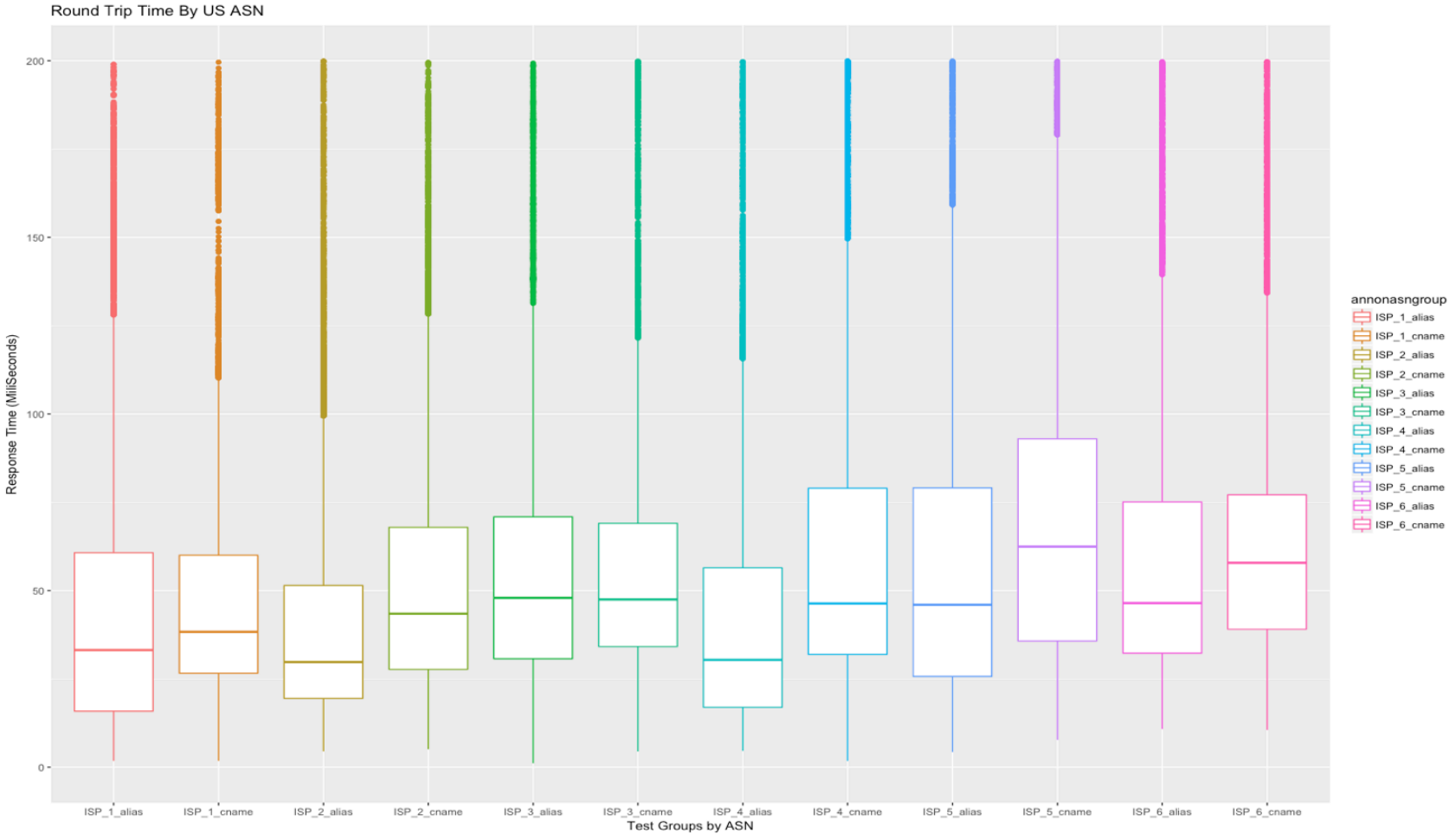
Median response time ALIAS: **38.89 ms**

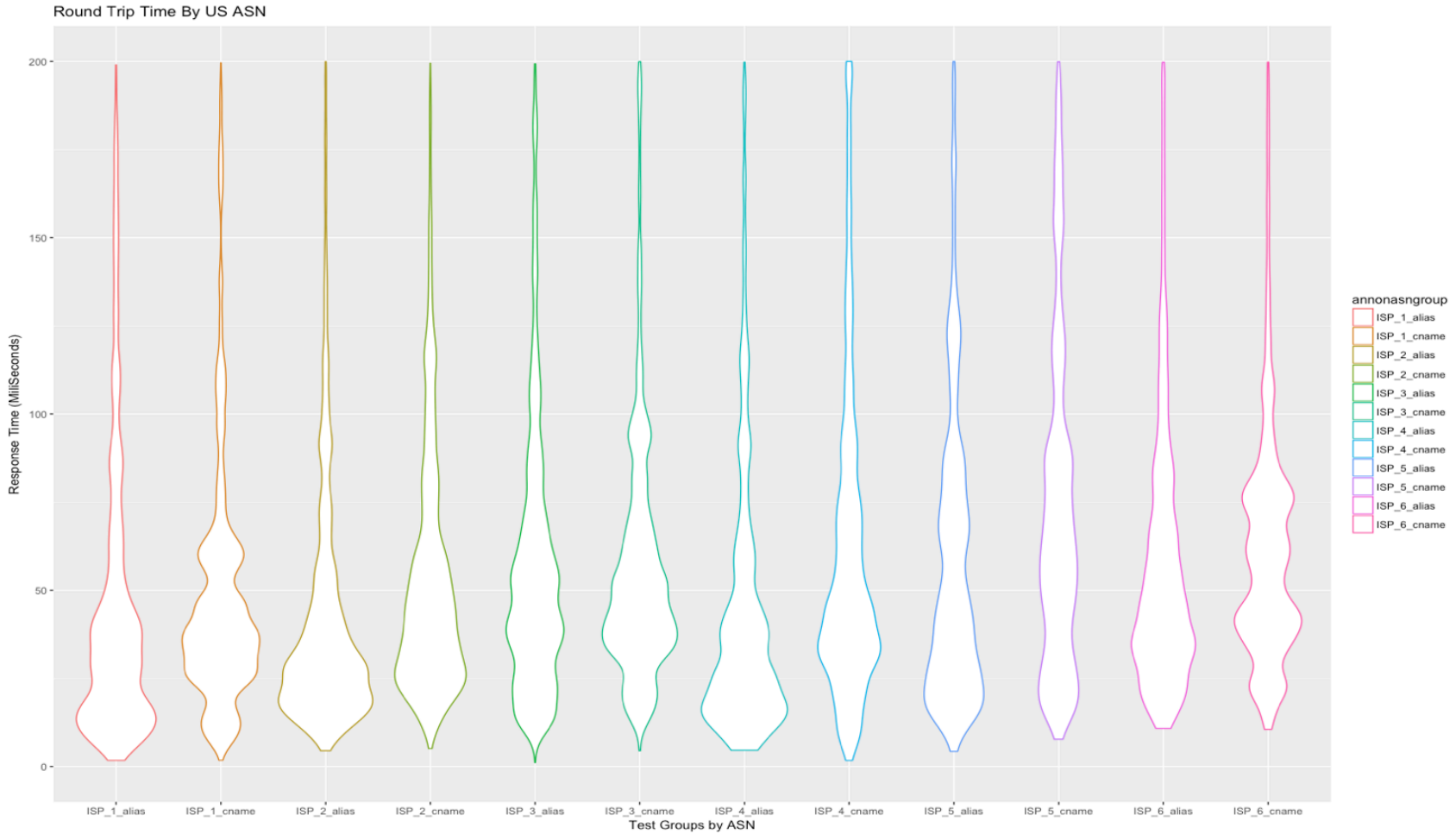
Median response time CNAME: **49.13 ms**

Round Trip Time Distribution - Single CNAME - United States







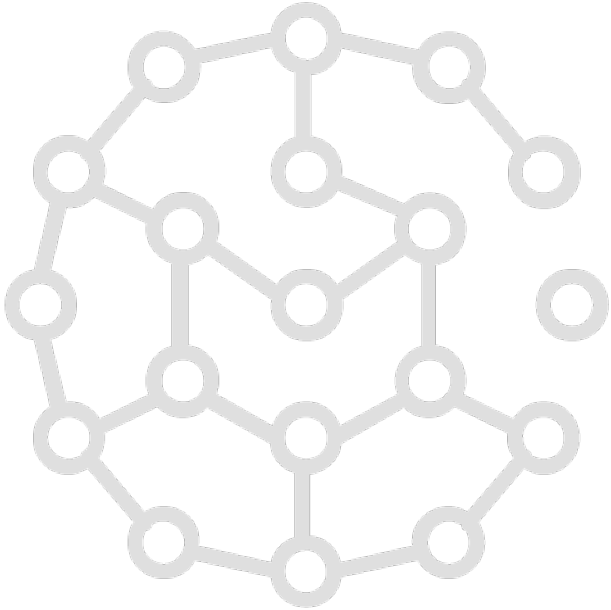


Kinks in the CNAME Chain

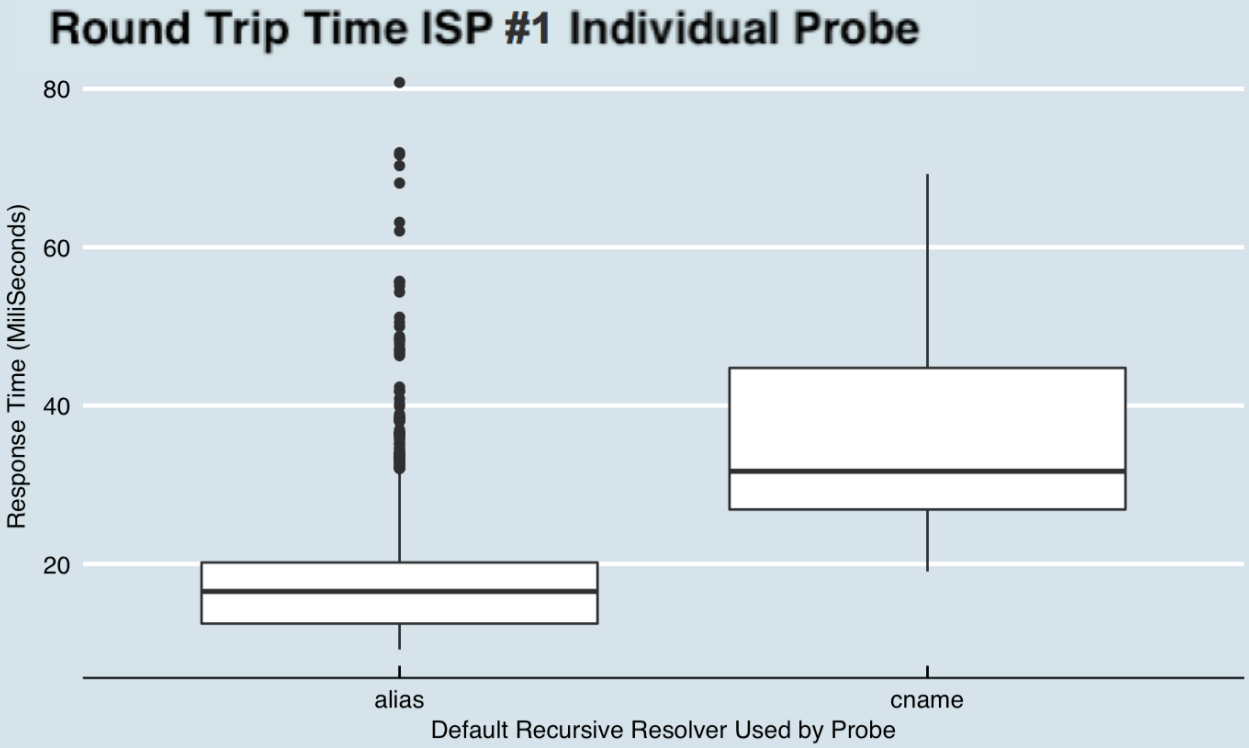
What happens if one of the links in the CNAME chain is broken/doesn't resolve?

- ALIAS responds with the fallback data (if any) or NODATA.
- In the current draft of IETF for ANAME...
  there is no fallback mechanism.

In the raw boxplots these kinds manifest as the outliers, dropped packets, multiple cache misses or long network paths.



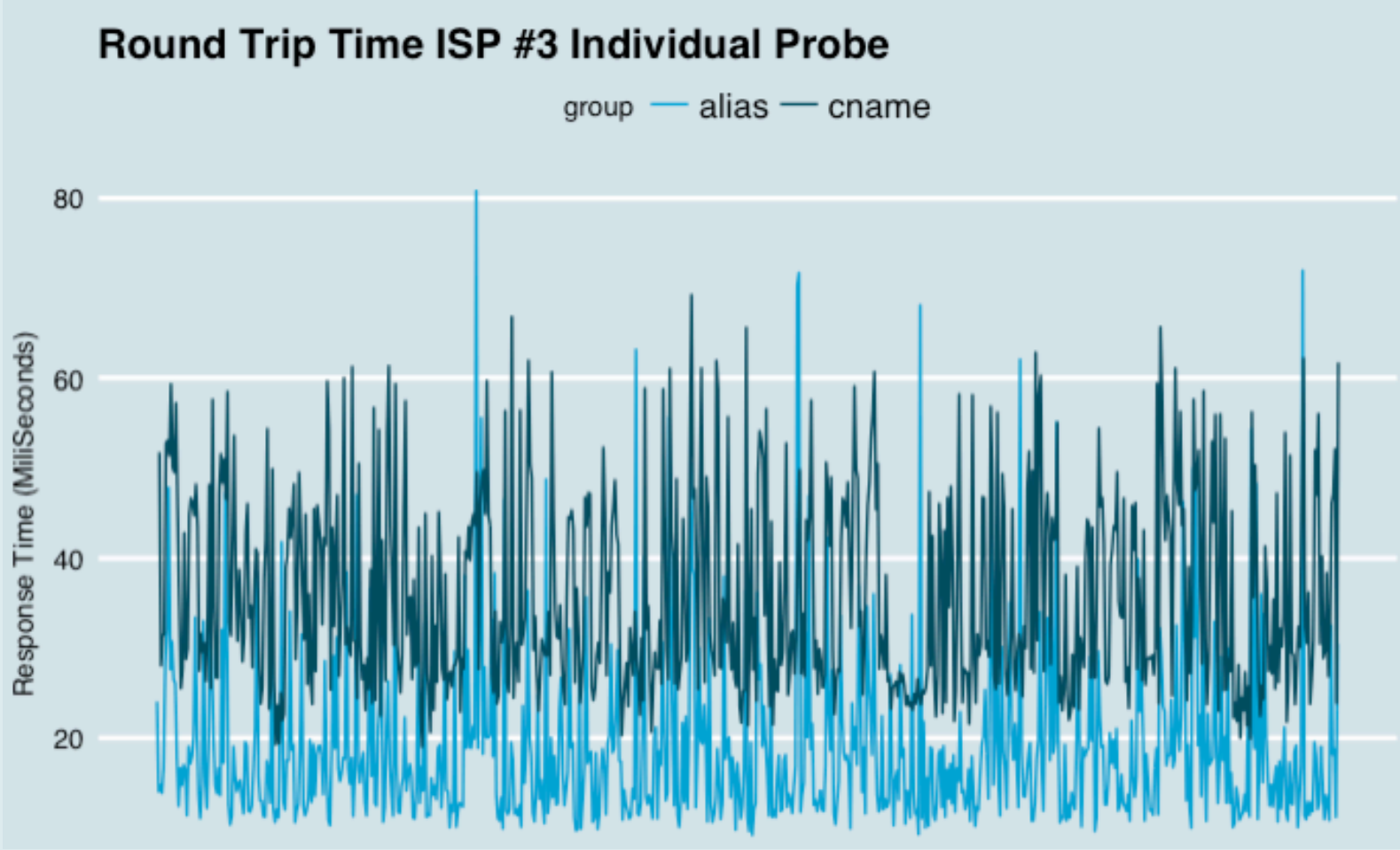
Last Mile Variability

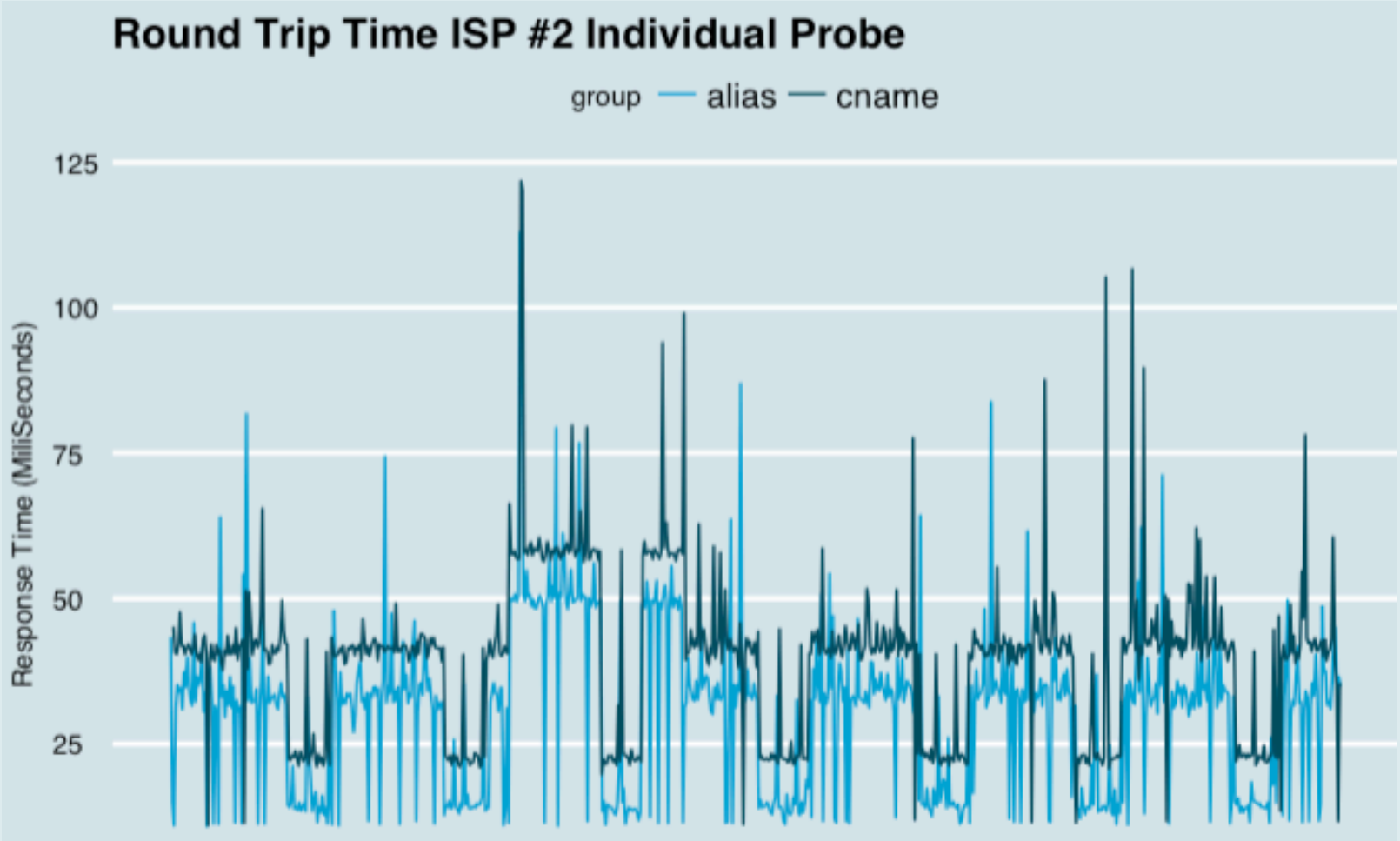


Understanding the outliers

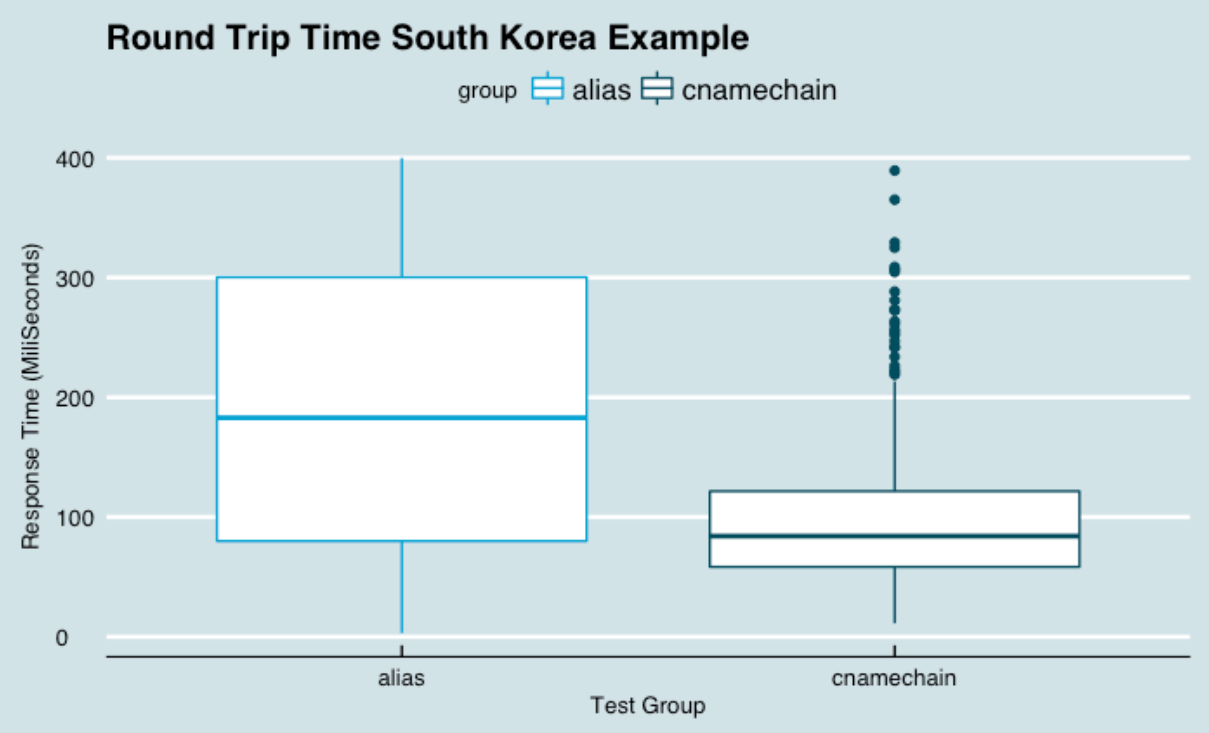
Local cache misses

Dropped packets





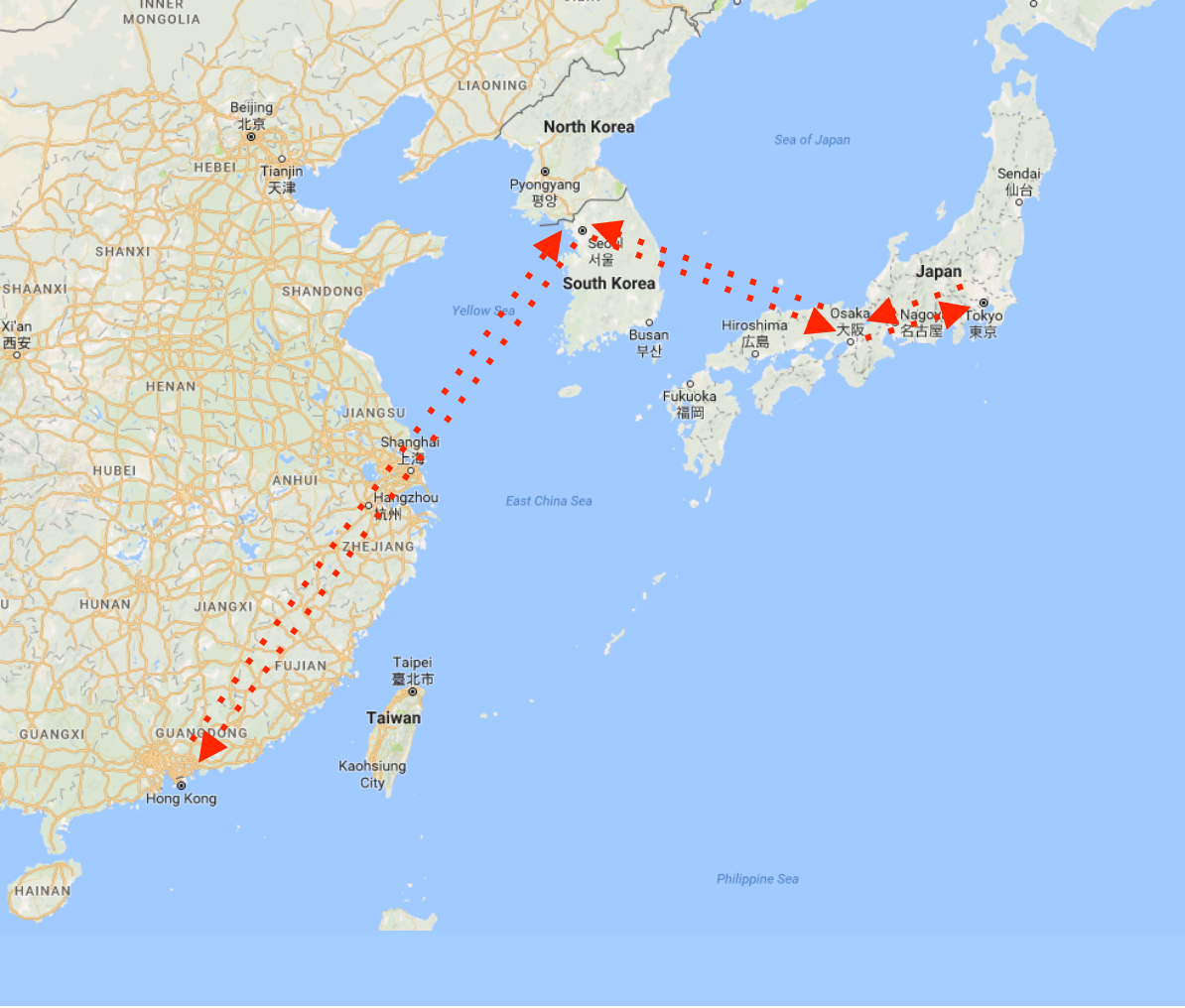
As fast as the network topography



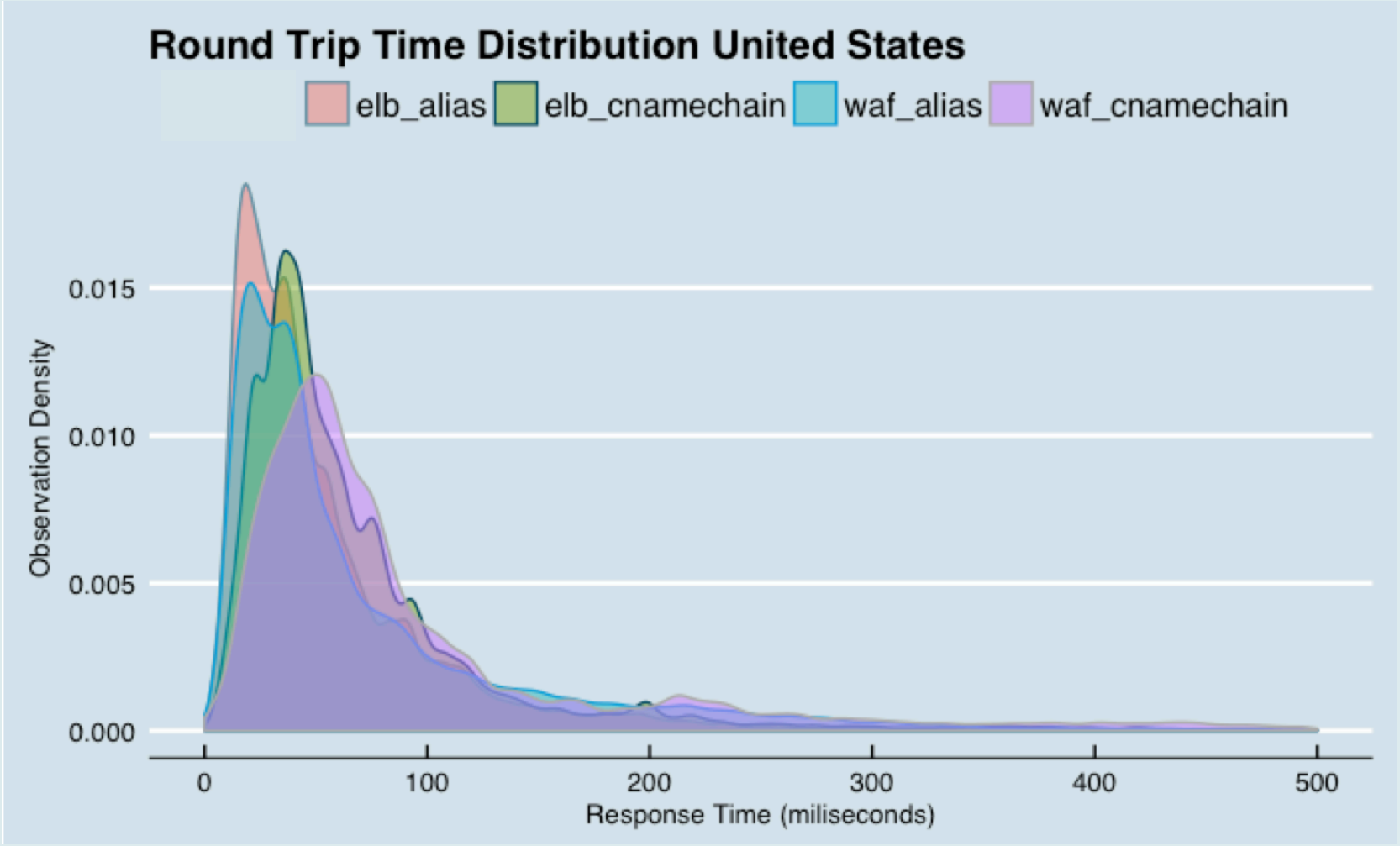
It is possible to create scenarios where ALIAS / ANAME records perform worse than CNAME chains.

This is where understanding underlying infrastructure becomes critical.

If the authoritative providers for the domains within the CNAME chain are closer in network proximity (within Korea) to the ALIAS authoritative ...



“Asia” is not one location



In Summary

- There are performance implications with CNAMES and CNAME chaining
- ALIAS Records can be used to flatten CNAMES as a service
- Your end-user experience is unique to your service based on where your infrastructure is and where they are coming from
- Monitor and measure often