

Timeouts:

Beware Surprisingly High Delay:

Collect Everything, Assume Nothing

Patrick Owen, Ramakrishna Padmanabhan,
Aaron Schulman, Neil Spring



Send a Ping

How long should we wait for a response before deciding that it isn't coming?

Conventional Wisdom

Scriptroute / Thunderping	3s (configurable)
Hubble / iPlane	2s plus one retry
ISI survey	3s (collects all)
SamKnows	3s
RIPE Atlas	1s
More?	?

Let's confirm ~3s!

- Dataset: ISI survey data
 - ~3s timeout for precise timing of *survey-detected responses*
 - Also captures *any received echo reply* and logs the time and source.
 - Three (long-term) rotating sources.
- Approach: Look at all response times, including those received after the timeout.

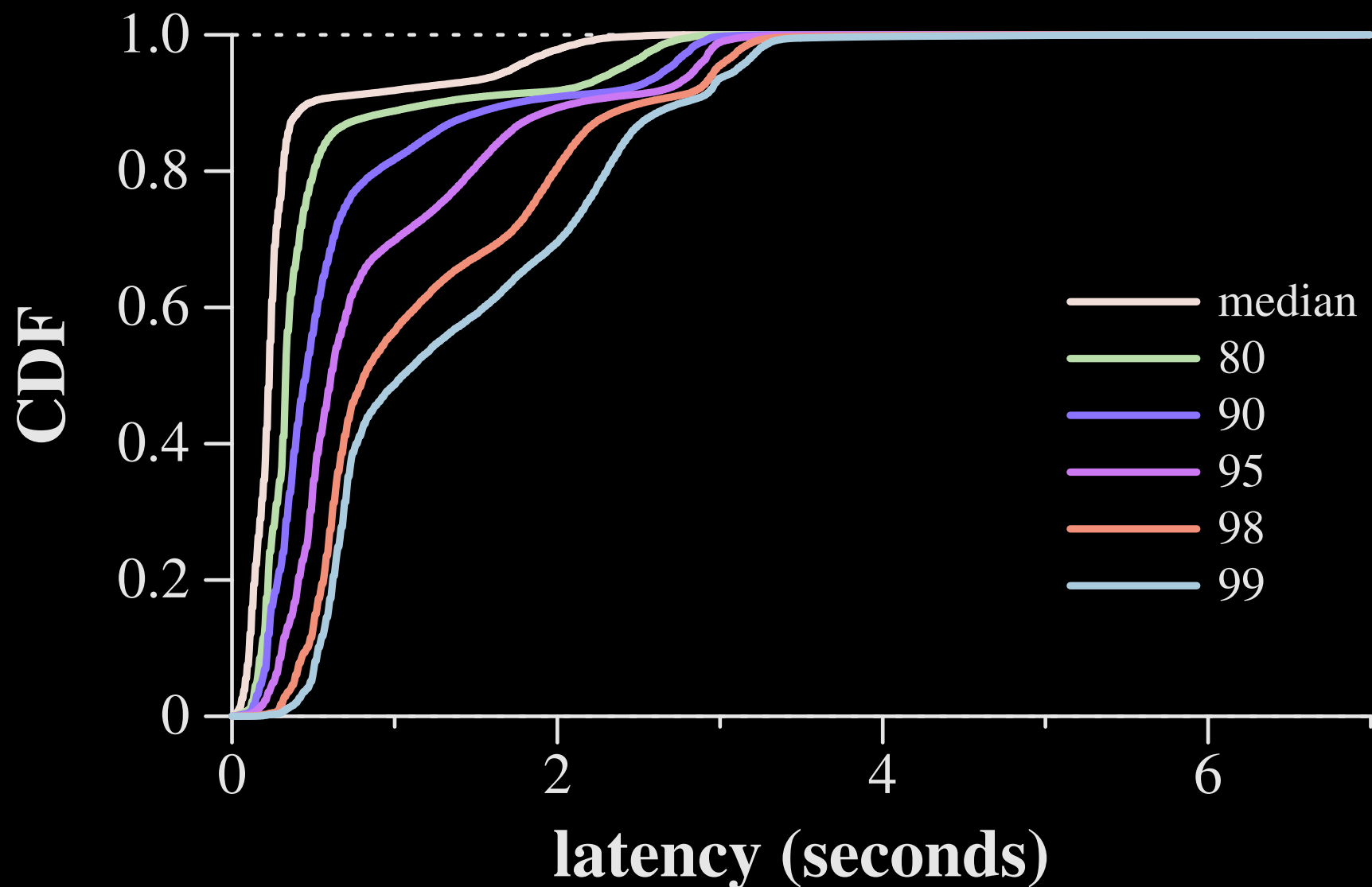
Transform Survey Data

[1320291701.0]	P	v119	1.99.16.242	1.99.16.242	2960.995	45
[1320292364.0]	P	v119	1.99.16.242	1.99.16.242	2767.092	45
[1320293027.0]	P	v119	1.99.16.242	error_time_out		
[1320293031.0]	P	v119	no_probe_ip	1.99.16.242	0.000 45	[d004]
[1320293691.0]	P	v119	1.99.16.242	error_time_out		
[1320293696.0]	P	v119	no_probe_ip	1.99.16.242	0.000 45	[d005]
[1320294354.0]	P	v119	1.99.16.242	error_time_out		
[1320294358.0]	P	v119	no_probe_ip	1.99.16.242	0.000 45	[d004]
[1320295017.0]	P	v119	1.99.16.242	error_time_out		
[1320295030.0]	P	v119	no_probe_ip	1.99.16.242	0.000 45	[d013]



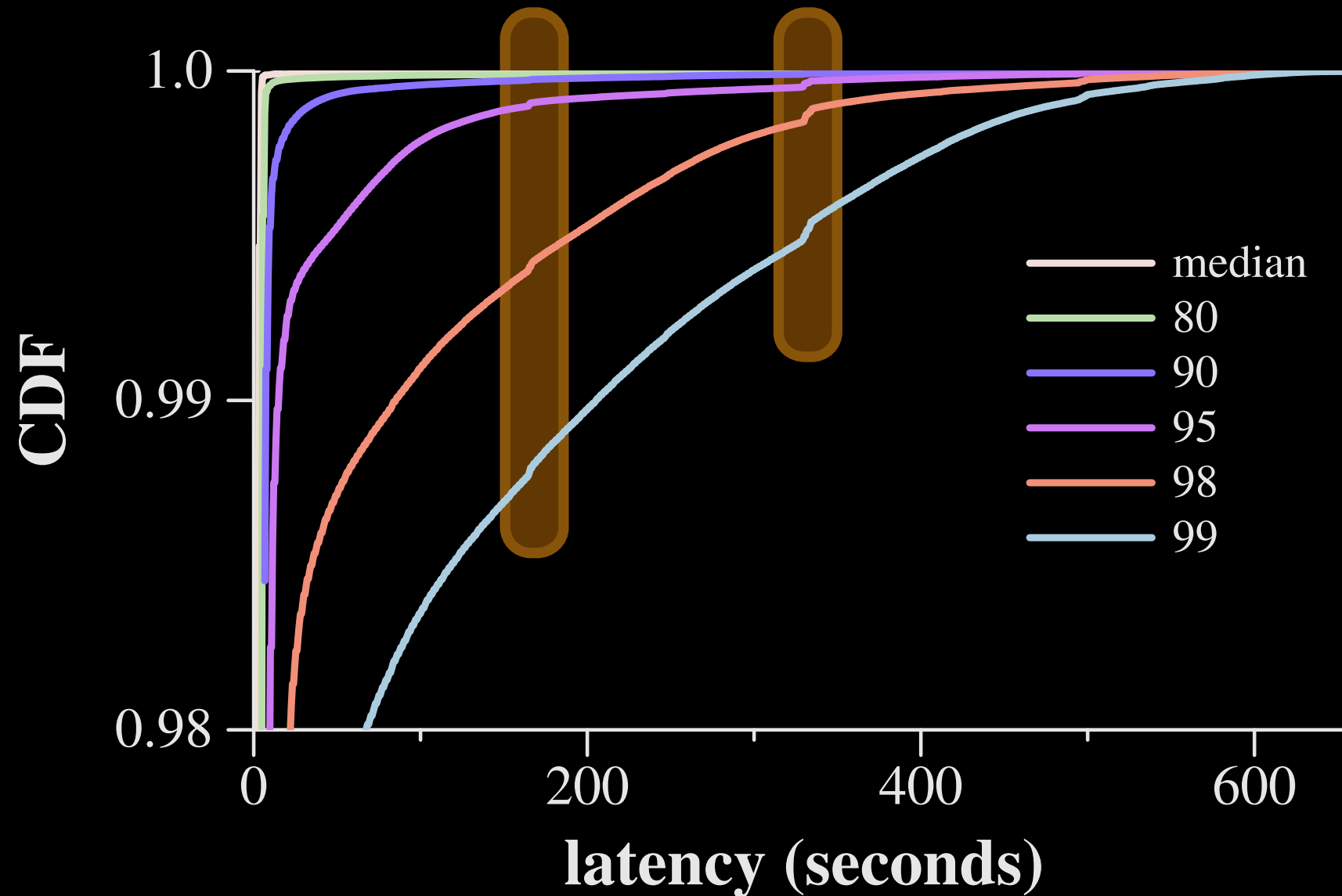
[1320291701.0]	P	v119	1.99.16.242	1.99.16.242	2960.995	45
[1320292364.0]	P	v119	1.99.16.242	1.99.16.242	2767.092	45
[1320293027.0]	P	v119	1.99.16.242	1.99.16.242	4000.0000	45
[1320293691.0]	P	v119	1.99.16.242	1.99.16.242	5000.0000	45
[1320294354.0]	P	v119	1.99.16.242	1.99.16.242	4000.0000	45
[1320295017.0]	P	v119	1.99.16.242	1.99.16.242	13000.0000	45

Survey-detected RTTs



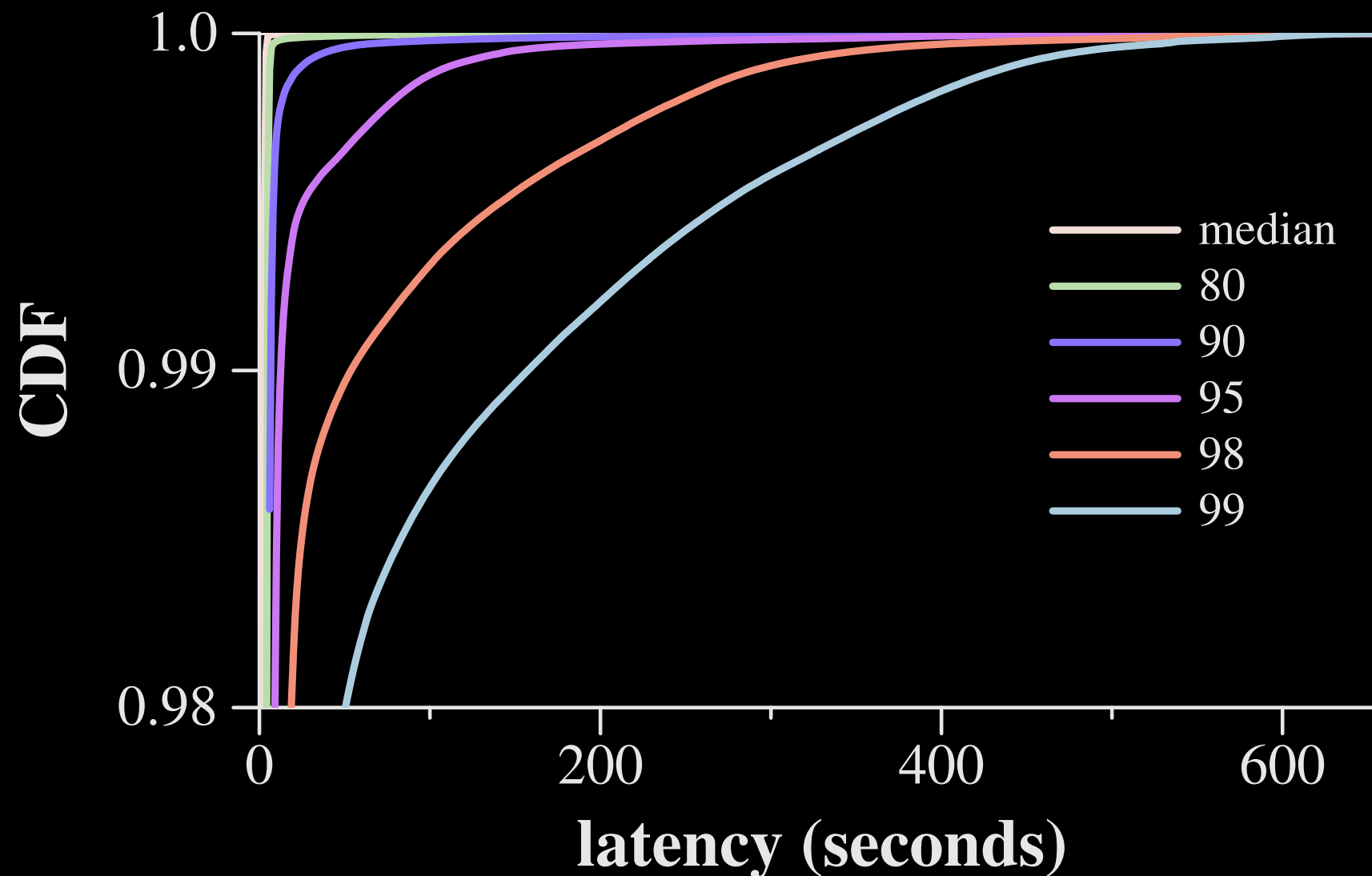
Over all IP addresses seen, compute median RTT, 80th, 90th, 95th, 98th, 99th percentiles, then CDF.

Include unmatched



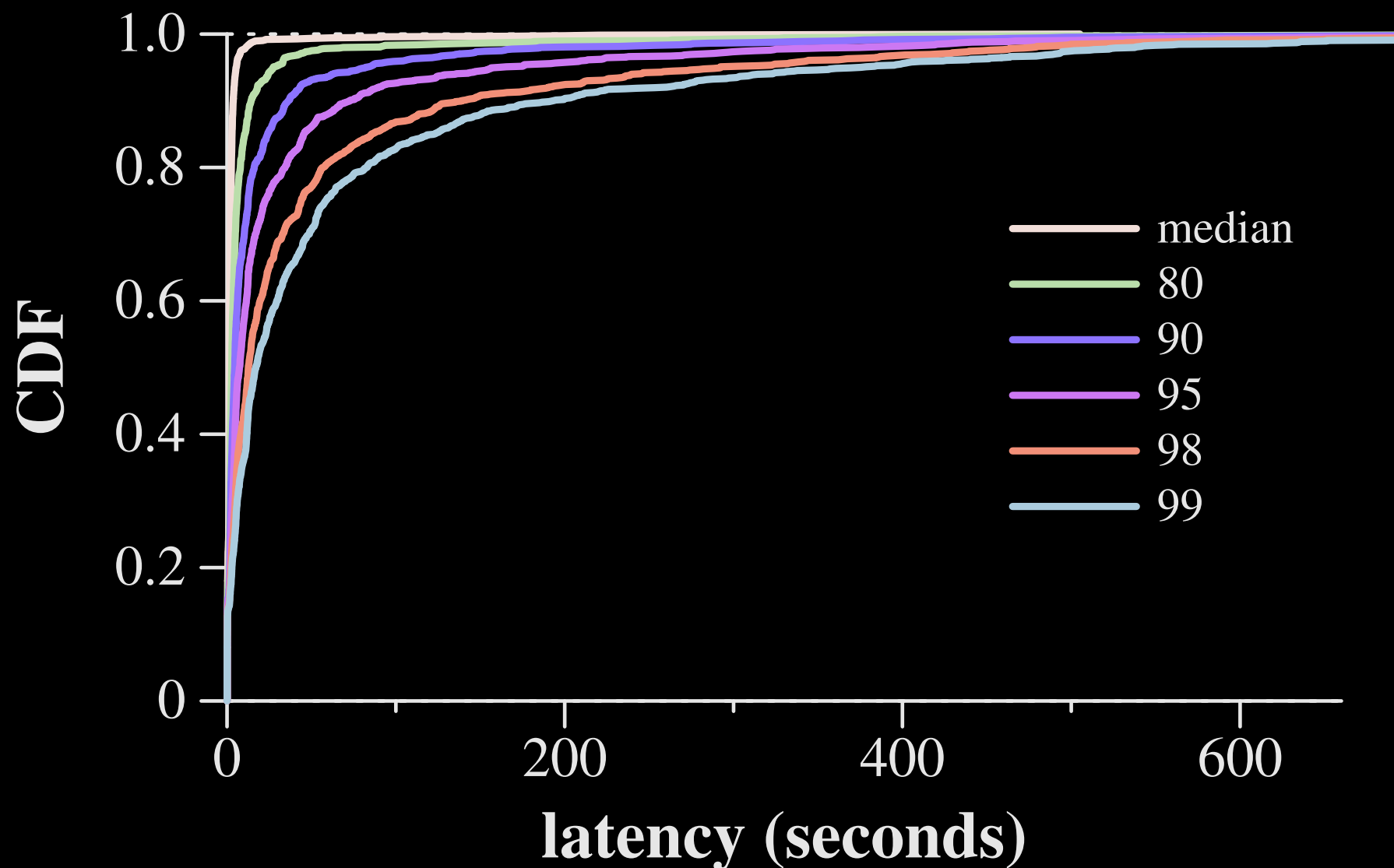
Match any incoming echo response with the prior timed-out echo request, add to survey-detected.

Filter out duplicates



Modes represented responses where a ping sent to a broadcast address was responded to by a previously probed address; also DoS responses.

Really?



Sampled 2000 of 20k high-rtt IP addresses, sent 1000 pings from our host using scamper. High RTT remains.

How long to wait?

		% of pings						
		1%	50%	80%	90%	95%	98%	99%
% of addresses	1%	0.01	0.05	0.11	0.13	0.16	0.29	0.34
	50%	0.12	0.24	0.35	0.5	0.67	0.92	1.21
	80%	0.19	0.33	0.57	1.34	2.20	5	7
	90%	0.24	1.00	2.39	4	6	8	11
	95%	0.31	2.43	5	6	7	12	18
	98%	0.37	4	6	7	11	20	52
	99%	0.43	4	6	8	14	55	159