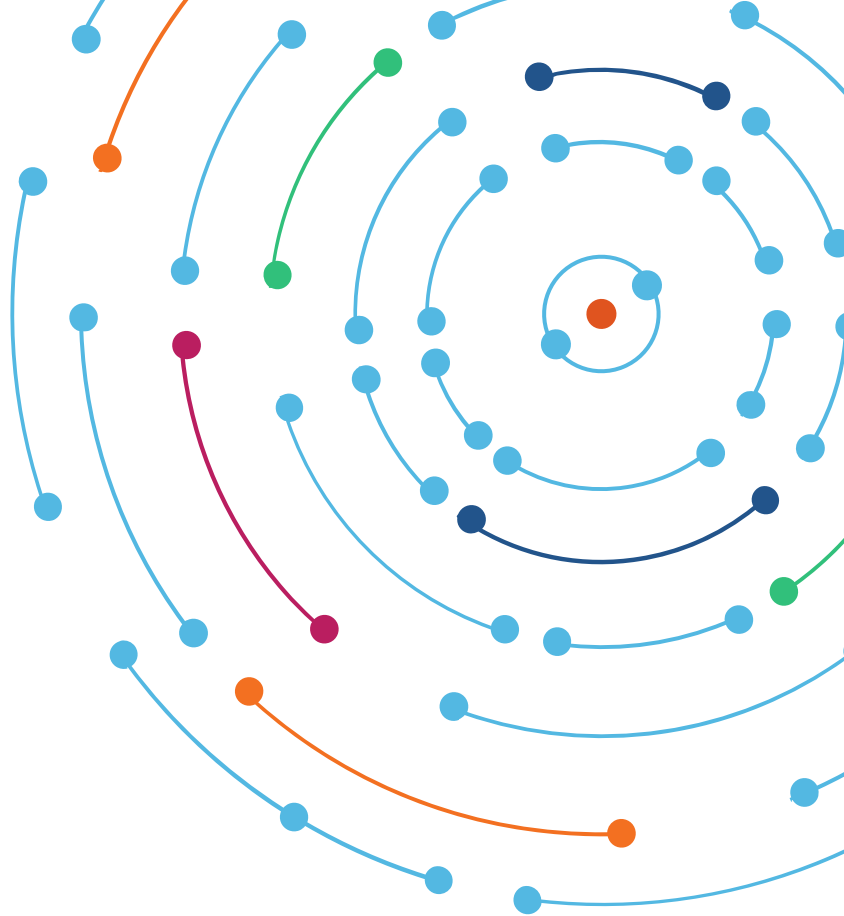





How Synthetic testing can help your peering strategy

Nina Bargisen
April 2022






First:
A little about me

And a bit about me

Nina Bargisen

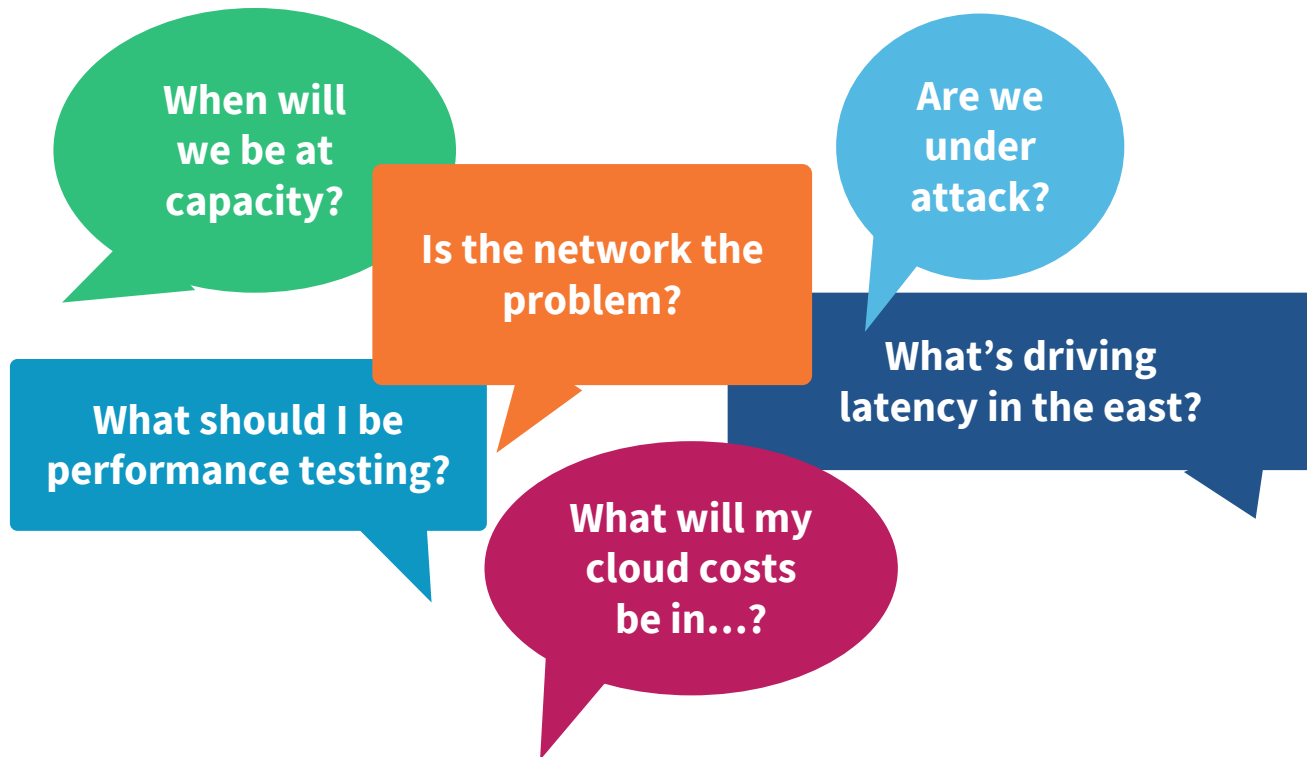
- Director, technical evangelism at Kentik
- **Prior to this** I spent a couple of decades building the internet at Subspace, Netflix and TDC
- A passionate sailor
- Learn more in the second episode of Network AF - a podcast series hosted by Kentik CEO Avi Friedman - <https://www.kentik.com/network-af/>
 - And enjoy the other episodes as well



Second:
A little about Kentik and network
observability

NETWORK **OBSERVABILITY**

The ability to answer *any* question about your network



Kentik is the Network Observability Company

300+
CUSTOMERS

95%+
CSAT

EVERY
NETWORK

>25%
INCREASED UPTIME

EVERY
COUNTRY

TRILLIONS
RECORDS/DAY

T Mobile

IBM

**verizon
media**

Uber

Principal

Booking.com

cisco

sky

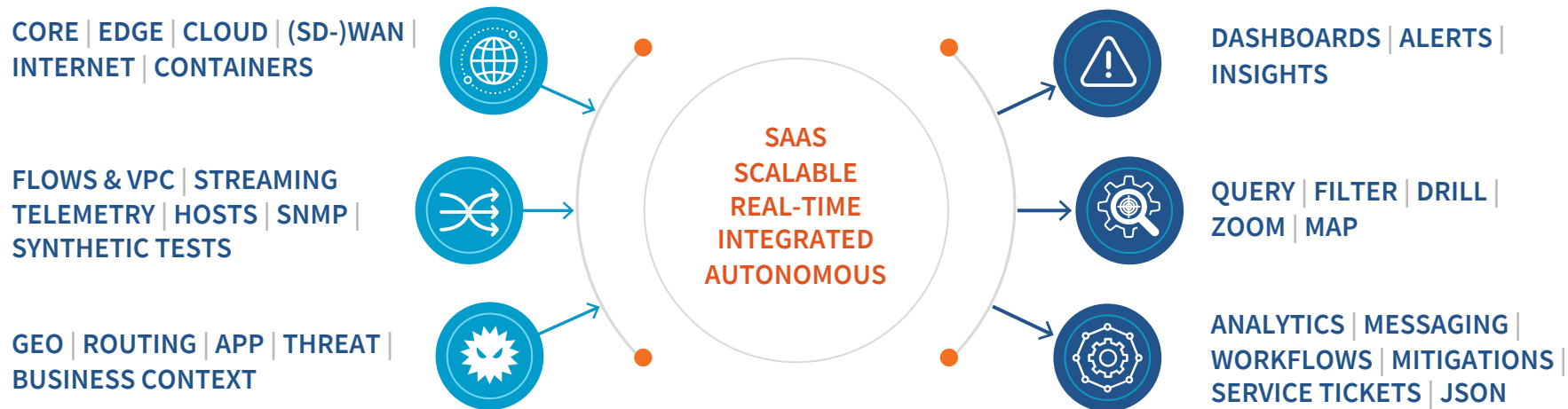
salesforce

KDDI

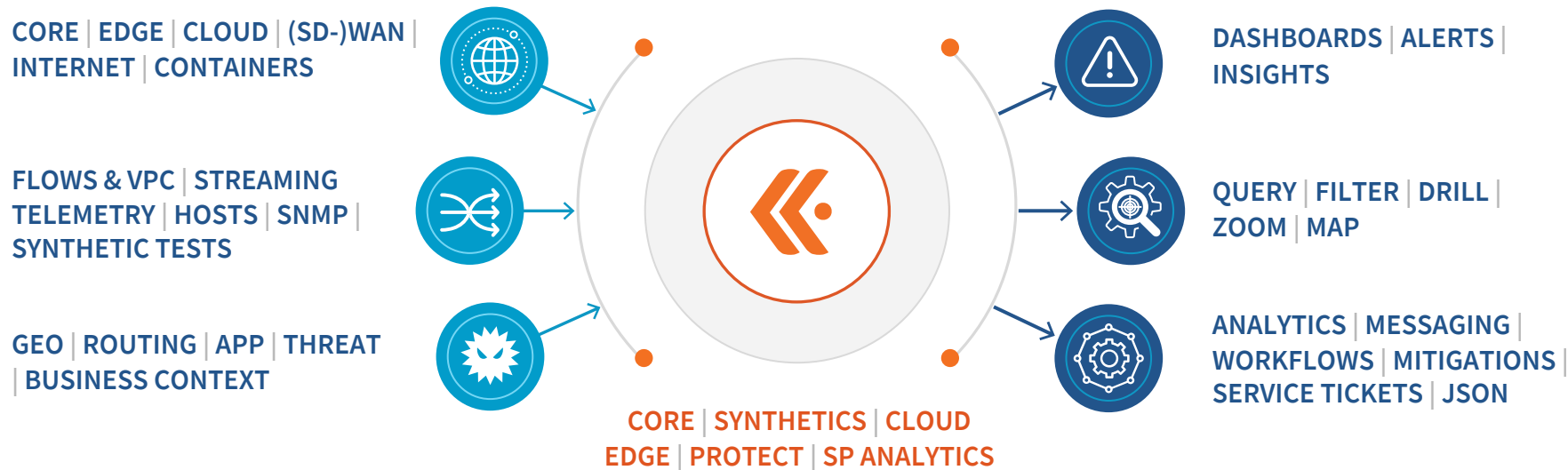
ebay

box

What Good Network Observability Looks Like



What Good Network Observability Looks Like



Kentik Firehose

THE KENTIK NETWORK OBSERVABILITY CLOUD



TELEMETRY

NetFlow, sFlow
VPC flow logs
SNMP

Streaming telemetry
Synthetics
BGP routing

CONTEXT

Application
User/subscriber
Geo-location
Infrastructure
Business attributes
Custom dimensions

MESSAGE BUS/ QUEUE

- Kafka
- Kinesis

OBSERVABILITY

- New Relic
- Splunk

REAL-TIME ANALYTICS

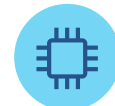
- InfluxDB
- Elasticsearch

DATA LAKES

- AWS S3
- Snowflake



Application
performance
troubleshooting



ML/AI



Risk & threat
analytics



Business
intelligence

Other Activities

Kentik Network Analysis Center

Kentik Labs

Network Observability



network observability (n) 1. The ability to answer any question about your network.

Observability is for the network, too

We have infrastructure we care about. If you're reading this, we imagine you do, too. Infrastructure can't exist without networks, and networks shouldn't exist without observability. We launched Kentik Labs to help you learn about, share and integrate network observability into your full-stack observability efforts.



Learn

We aim to work alongside developers and SREs to level-up skills, democratize network observability and keep infrastructure running.



Share

Projects we open source are designed to help build an observability community who can be fearless in the face of performance and UX issues.



Integrate

We meet you where you are. We partner with tools you already use so that projects we share can be instantly integrated and helpful.





Peering

The motions of peering

What is it that we do?



Analyze



plan



Negotiate



Operate

Analyze: traffic quality

When I started out in peering

We used these tools to monitor quality

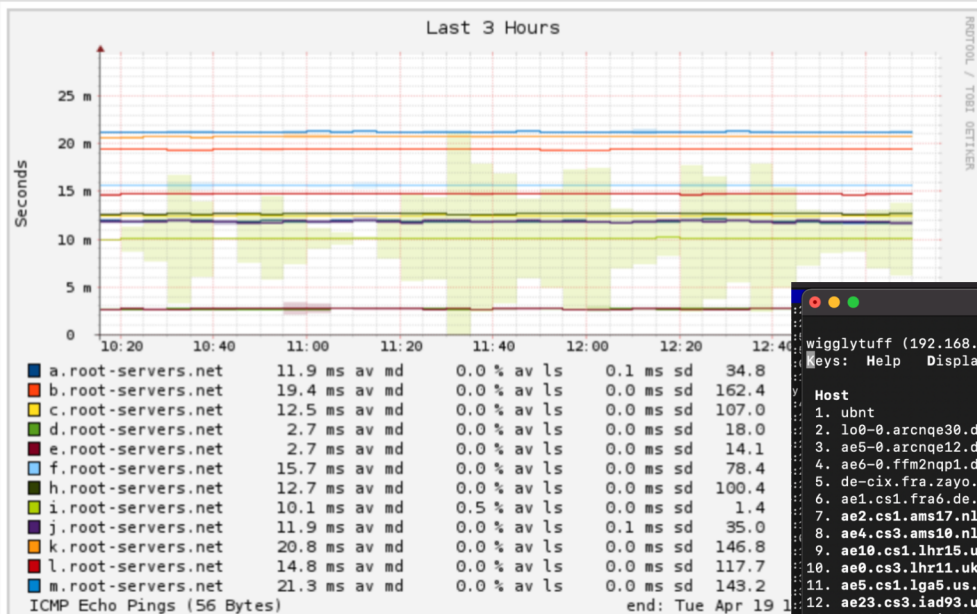
Smokeping

- Permanently monitoring selected DNS and root servers globally
- Need to go to page and look at graphs to detect anomalies

MTR and Traceroute

- Ad hoc debugging
- Ad hoc analysis as part of peering and connectivity investigations

DNS Root Servers as seen from UPC



```
nina - sudo mtr 192.136.136.47 - mtr - mtr - sudo - 116x45
My traceroute [v0.95]
2022-04-21T10:47:24+0200
Keys: Help Display mode Restart statistics Order of fields quit

Host
1. ubnt
2. lo0-0.arcnqe30.dk.ip.tdc.net
3. ae5-0.arcnqe12.dk.ip.tdc.net
4. ae6-0.ffmpeg1.de.ip.tdc.net
5. de-cix.fra.zayo.com
6. ae1.cs1.fra6.de.eth.zayo.com
7. ae2.cs1.ams17.nl.eth.zayo.com
8. ae4.cs3.ams10.nl.eth.zayo.com
9. ae10.cs1.lhr15.uk.eth.zayo.com
10. ae0.cs3.lhr11.uk.eth.zayo.com
11. ae5.cs1.lga5.us.eth.zayo.com
12. ae23.cs3.iad93.us.eth.zayo.com
13. ae103.mpr1.iad8.us.zip.zayo.com
14. 209.66.80.14.ipyx-132715-zyo.zip.zayo.com
15. 192.136.136.198
16. (waiting for reply)

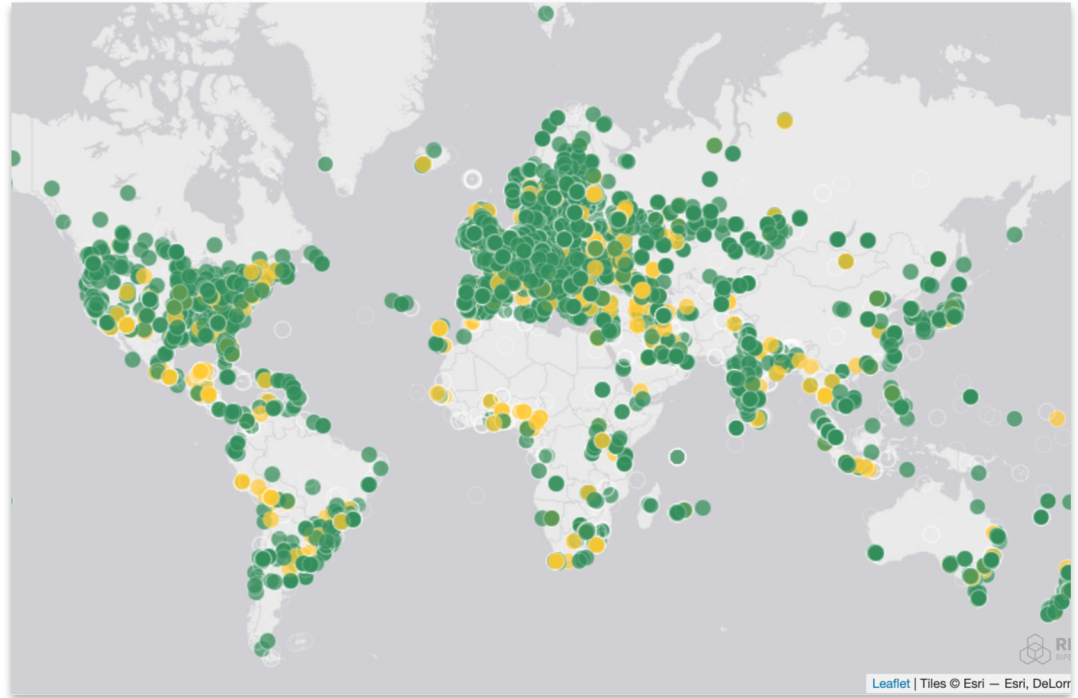
Packets
Loss% Snt Last Avg Best Wrst StDev
0.0% 67 3.8 5.3 3.0 117.3 13.9
0.0% 67 4.2 7.1 3.2 77.4 11.4
0.0% 67 4.1 5.5 3.1 38.2 5.1
0.0% 67 19.3 22.6 18.2 229.0 25.6
0.0% 67 19.8 25.3 19.3 187.0 25.7
0.0% 67 105.5 108.7 104.4 269.7 20.5
90.9% 67 105.2 105.6 104.5 107.3 1.0
97.0% 67 106.2 107.9 106.2 109.5 2.3
92.4% 67 106.0 124.3 105.6 198.7 41.6
97.0% 67 105.6 106.1 105.6 106.5 0.6
89.4% 67 106.7 106.5 105.7 109.1 1.2
97.0% 67 105.2 105.8 105.2 106.4 0.8
0.0% 67 104.6 107.3 104.6 192.6 11.0
0.0% 67 105.4 108.1 104.5 222.5 15.4
0.0% 67 106.7 110.4 105.4 290.2 24.4
```

Today - we can test much more

| Layer | Test Types & Features | | | | |
|-------------|--|---------------------------------|----------------------|----------------------|-----|
| WEB/ APP | HTTP/ API | Page Load (incl. DOM Waterfall) | | | |
| | Transaction (script/ recorder) | | | FTP | OTT |
| DNS | Server Monitor | | Grid | | |
| ROUTING | Route/ Event Viewer | | Hijack Detection | | |
| | Prefix Reachability Tracking | | Path Change Tracking | | |
| | AS PATH Visualization | | RPKI Status Check | Route Leak Detection | |
| | Peer Selection | | Internal BGP | Community Check | |
| NETWORK | IP Address | Hostname | Trace/ Path | | |
| | Mesh (NxN) | | Grid (MxN; N>>M) | | |
| | Autonomous (ASN, CDN, City, Country, Region) | | | | |
| | Bandwidth/ Throughput/ “iPerf” | | | | |

Global agents

- Agents distributed globally
- Offering the ability for a range of tests
- Community based , collaborative and commercial platforms available
- Examples
 - Kentik
 - RIPE Atlas
 - RING
 - TE

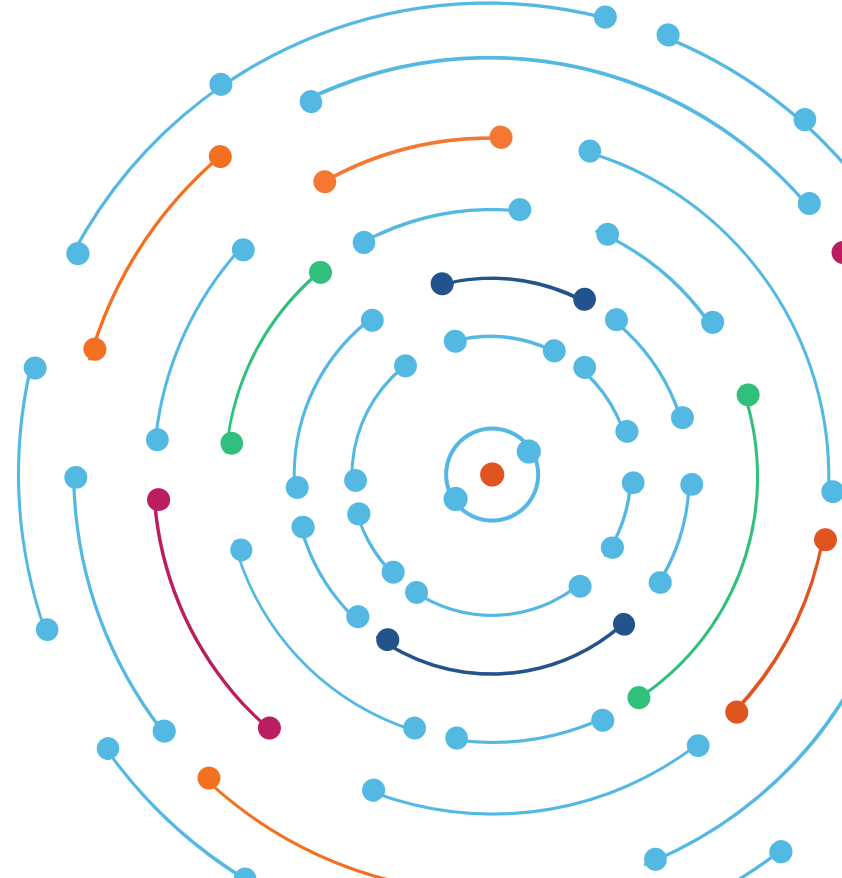


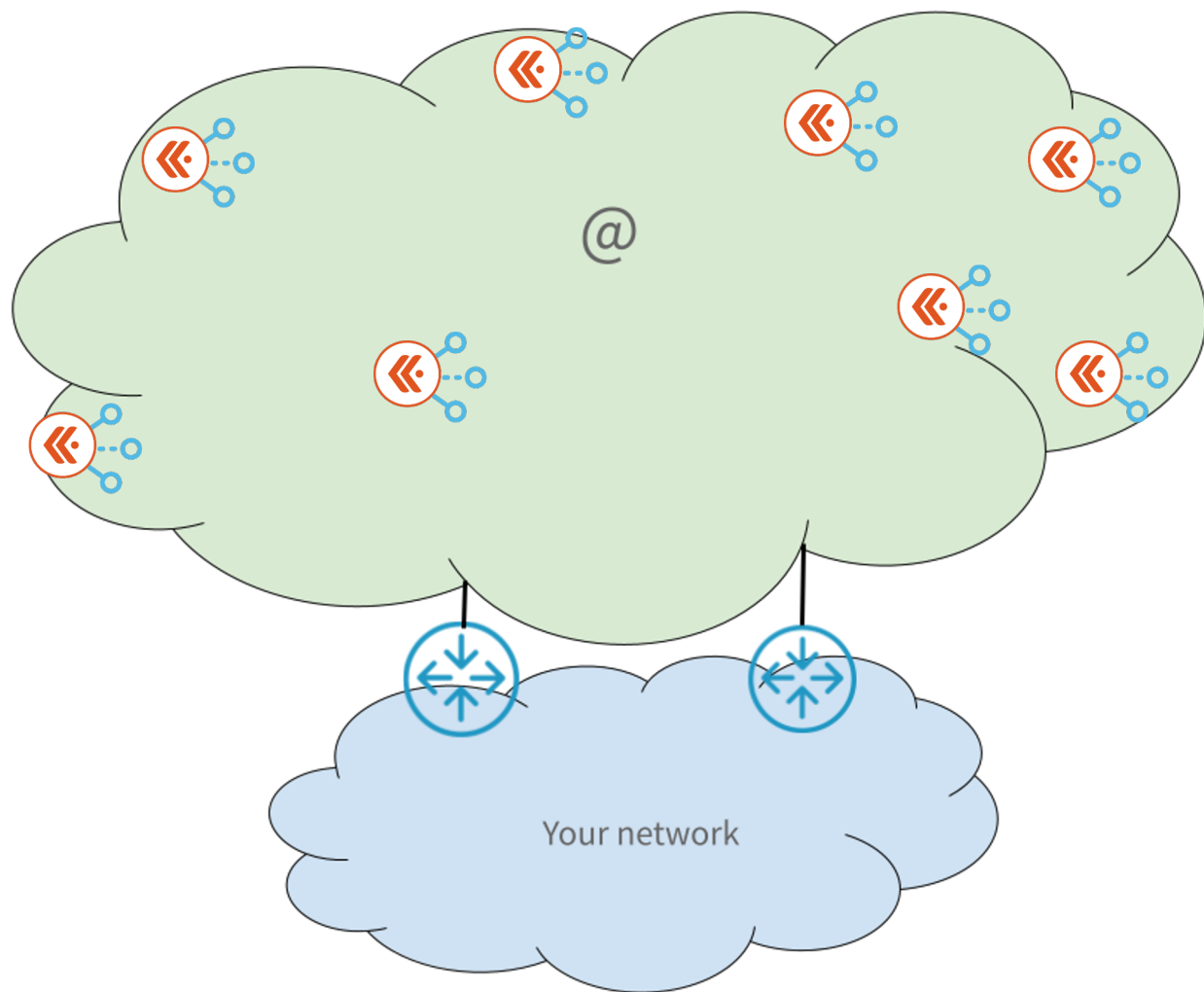
Ripe Atlas probes and ankers

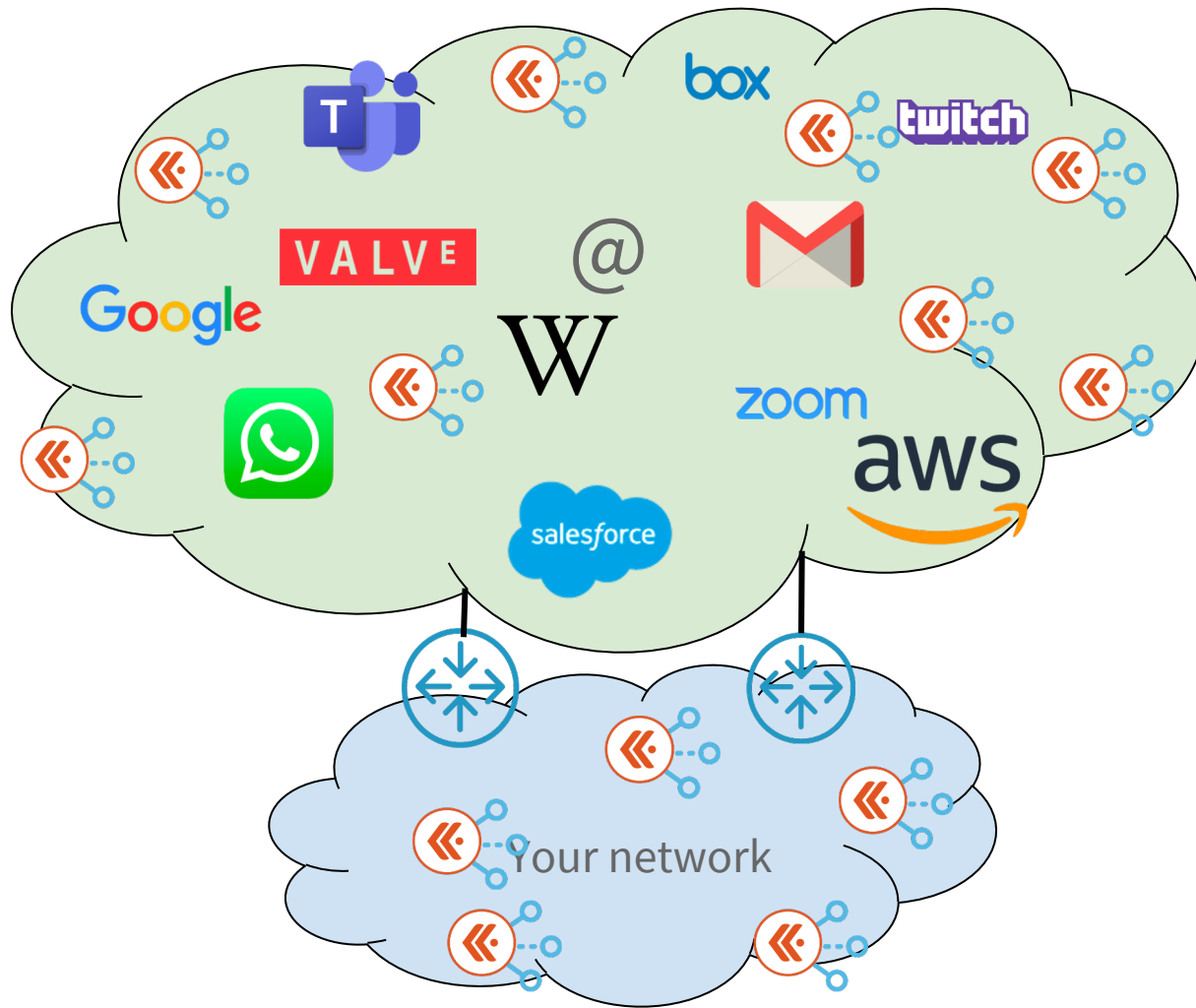
Kentik Global Synthetic Performance Agents



So, what does this have to do with peering?







Global Agents

- test services inside your network
- Test gateway availability
- Test routing to your network
- Test global reachability
 - Destinations inside your network
 - Destinations on the internet

Private Agents

- Test routing from your network to destinations of interest
 - Inside your network
 - Outside your network
- Test latency to selected destinations
- Test services used by your customers from inside your network

HOSTNAME cloud.ibm.com

IBM Cloud

Healthy

Time Range (UTC)
Last 1h

Results Path View Insights 0

Show Show 6 of 6 agents

Group hops by Site: 0 after agent, 0 before target

Highlight Latency >= 50ms

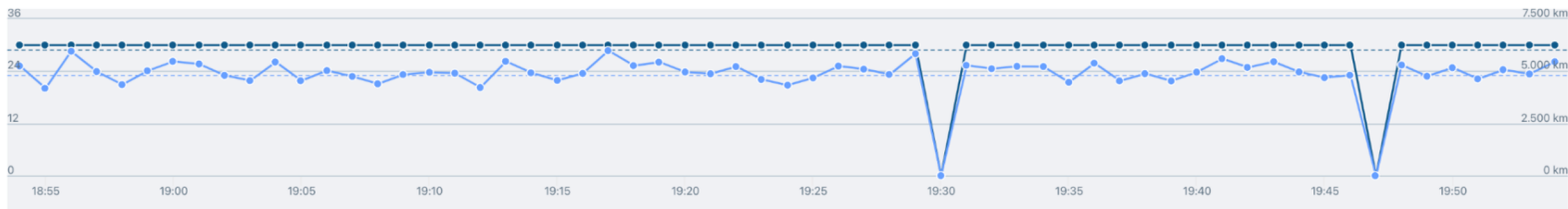
Packet loss >= 10%

☐ Collapse Timeouts ☒ Highlight links exceeding geo latency estimate

Path Hops and Geo Distance

Number of hops and distance are derived from traceroute data and IP Geocoding.

● Number of traceroute hops ● Sum of distance over all hops in traceroute



London, United Kingdom

Frankfurt, Germany

Dallas, TX, United States

Ashburn, VA, United States

Collapsed Path

0 / 3
Target
23.75.200.69

Legend

AS9498 - Bharti Airtel,IN AS14061 - Digital Ocean,US AS14618 - Amazon,US AS20940 - Akamai,NL AS33438 - Stackpath (Highwinds),US AS36351 - IBM Cloud (SoftLayer),US

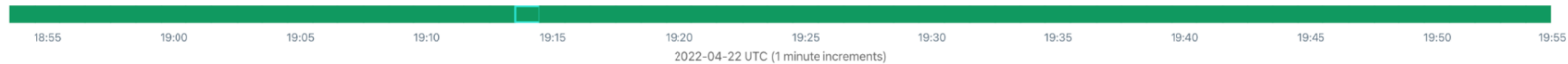
HOSTNAME cloud.ibm.com

IBM Cloud

Healthy

Time Range (UTC)
Last 1h

Results Path View Insights 0

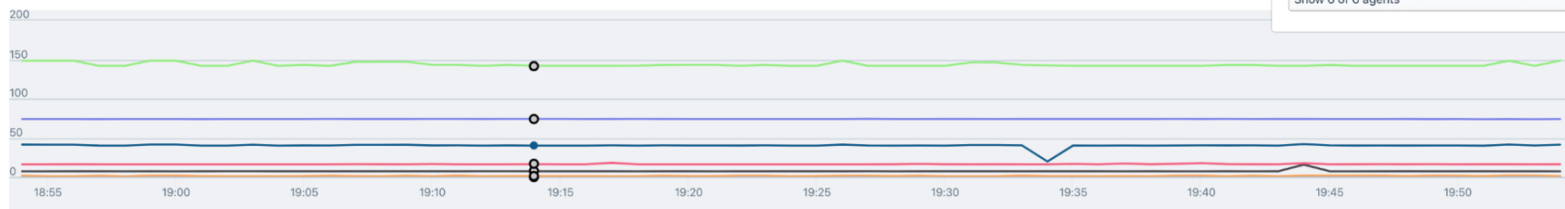


Map

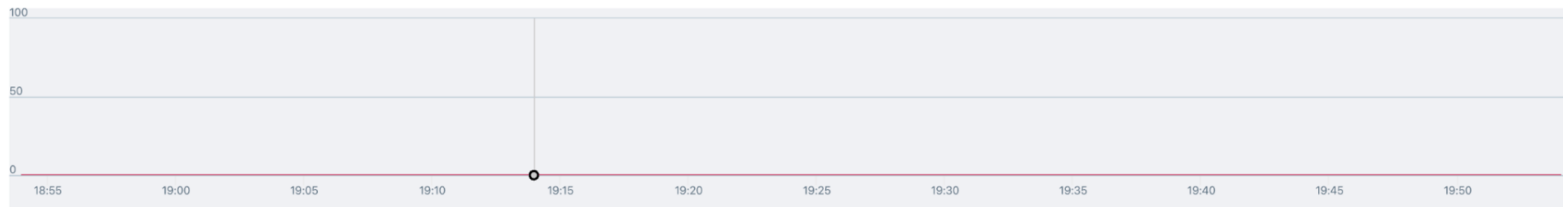
Time Series

Time series

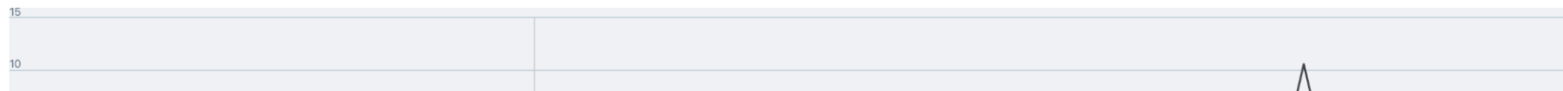
Avg Latency



Packet Loss



Avg Jitter



CDN

CDN Test - Akamai

Healthy

Time Range (UTC)
Last 1hResults [Path View](#) Insights 0

Show Show 5 of 5 agents

Group hops by Site: 0 after agent, 0 before target

Highlight Latency >= 50ms

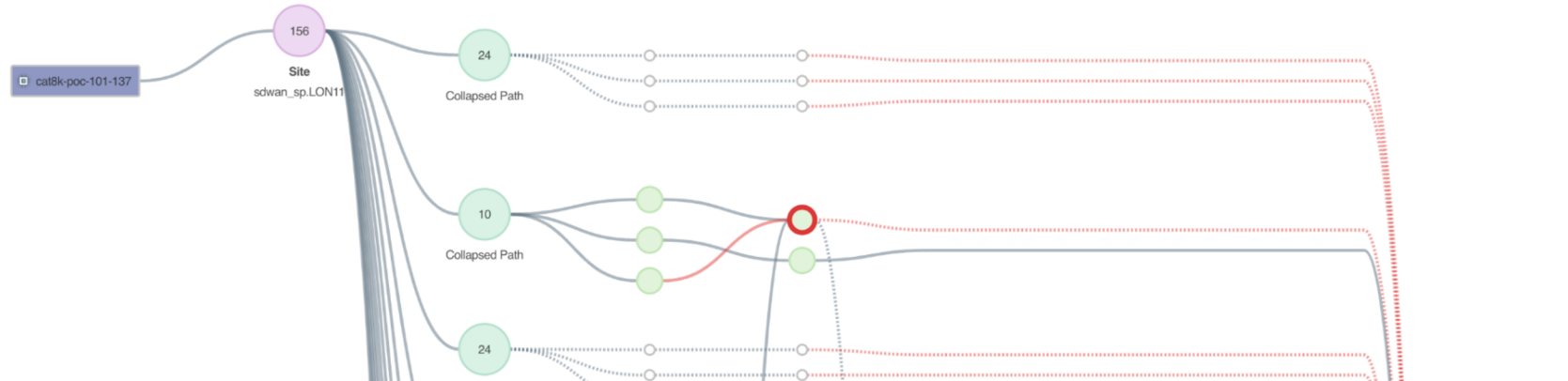
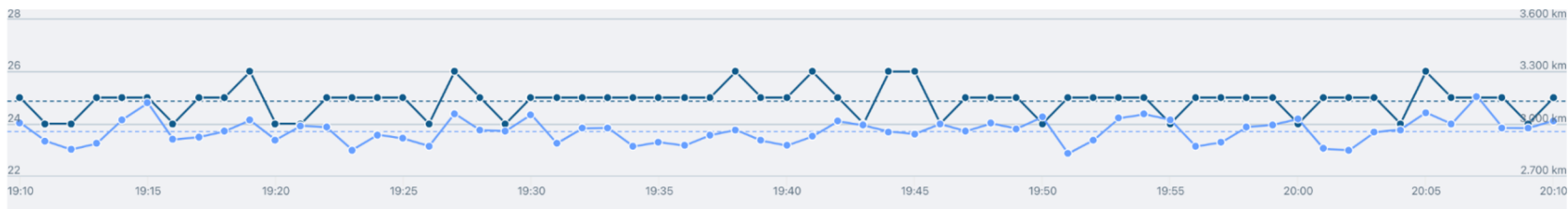
Packet loss >= 10%

☒ Collapse Timeouts ☒ Highlight links exceeding geo latency estimate [Reset](#)

Path Hops and Geo Distance

Number of hops and distance are derived from traceroute data and IP Geocoding.

● Number of traceroute hops ● Sum of distance over all hops in traceroute



CDN

CDN Test - Akamai

Healthy

Time Range (UTC)
Last 1h

Results

Path View

Insights 0

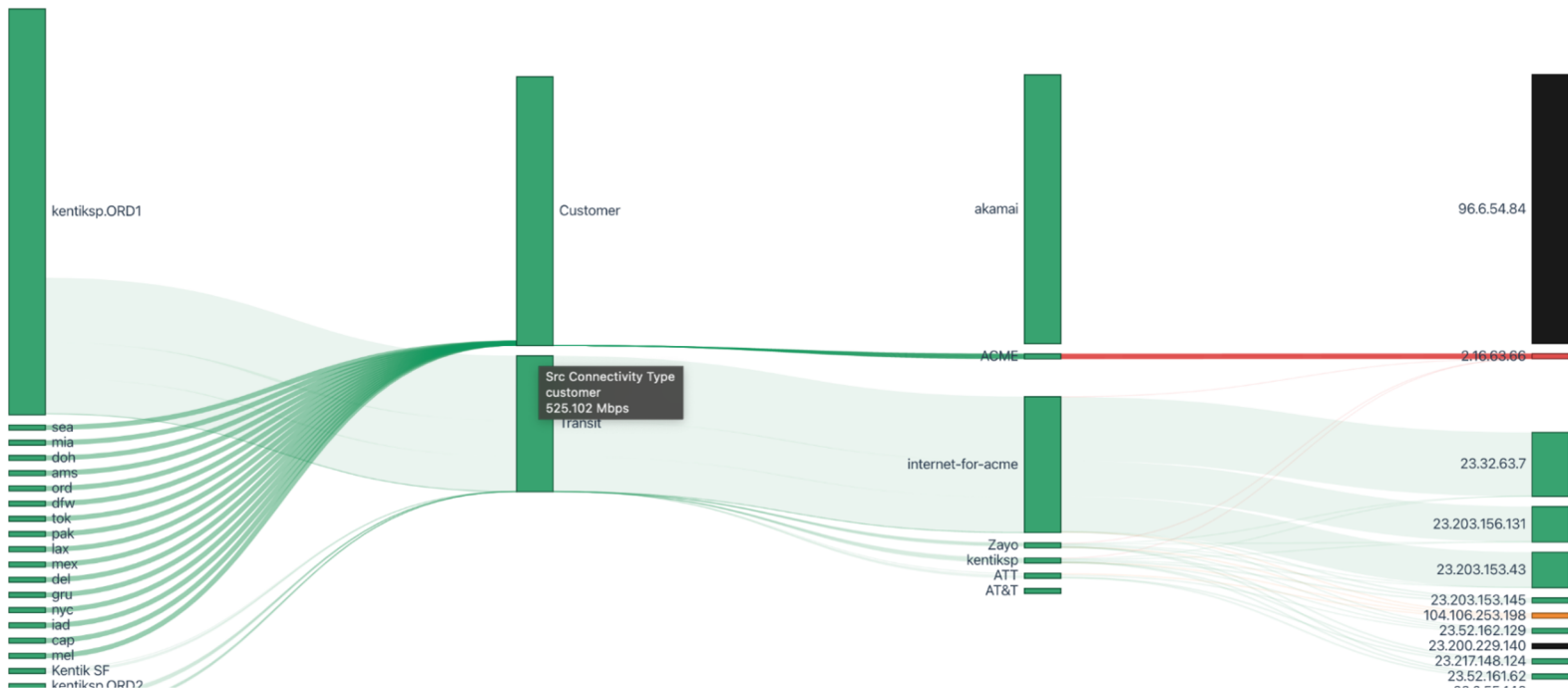


2022-04-22 UTC (1 minute increments)

Sankey

Map

Time Series



State of the Internet Free!









































































Performance, uptime & connectivity state of common public applications, services, clouds & networks that may impact your applications, networks & services

SaaS Applications

Public Clouds

DNS Services

Kentik continuously monitors availability and uptime of common DNS service providers using Synthetic agents located across the globe and provides you a view of overall health for free.
If you want any new providers added [click here](#) and let us know the IP(s) and Hostname(s).













| Agent ^ | CLOUDFLARE | Google | 9999 Quad9 | OpenDNS | dnsimple | neustar | VeriSign |
|---|---|---|---|---|---|---|---|
| Ashburn, VA, United States   aws us-east-1 |  |  |  |  |  |  |  |
| Cape Town, South Africa   aws af-south-1 |  |  |  |  |  |  |  |
| Chicago, IL, United States  The Constant Company (Choopa),US (20473) |  |  |  |  |  |  |  |
| Dallas, TX, United States  Akamai (Linode),US (63949) |  |  |  |  |  |  |  |
| Frankfurt, Germany  Akamai (Linode),US (63949) |  |  |  |  |  |  |  |
| London, United Kingdom   aws eu-west-2 |  |  |  |  |  |  |  |
| Mumbai, India   aws ap-south-1 |  |  |  |  |  |  |  |
| New York, United States  Digital Ocean,US (14061) |  |  |  |  |  |  |  |
| Paris, France   aws eu-west-3 |  |  |  |  |  |  |  |
| Portland, OR, United States   aws us-west-2 |  |  |  |  |  |  |  |
| San Francisco, CA, United States   aws us-west-1 |  |  |  |  |  |  |  |
| San Jose, CA, United States  IBM Cloud (SoftLayer),US (36351) |  |  |  |  |  |  |  |
| Sao Paulo, Brazil  |  |  |  |  |  |  |  |

Performance, uptime & connectivity state of common public applications, services, clouds & networks that may impact your applications, networks & services

 SaaS Applications
  Public Clouds
  DNS Services

Kentik continuously monitors connectivity within and between public clouds using Synthetic agents located in various regions of key cloud providers and provides you a view of overall health for free. If you want any new regions or providers added [click here](#) and let us know.

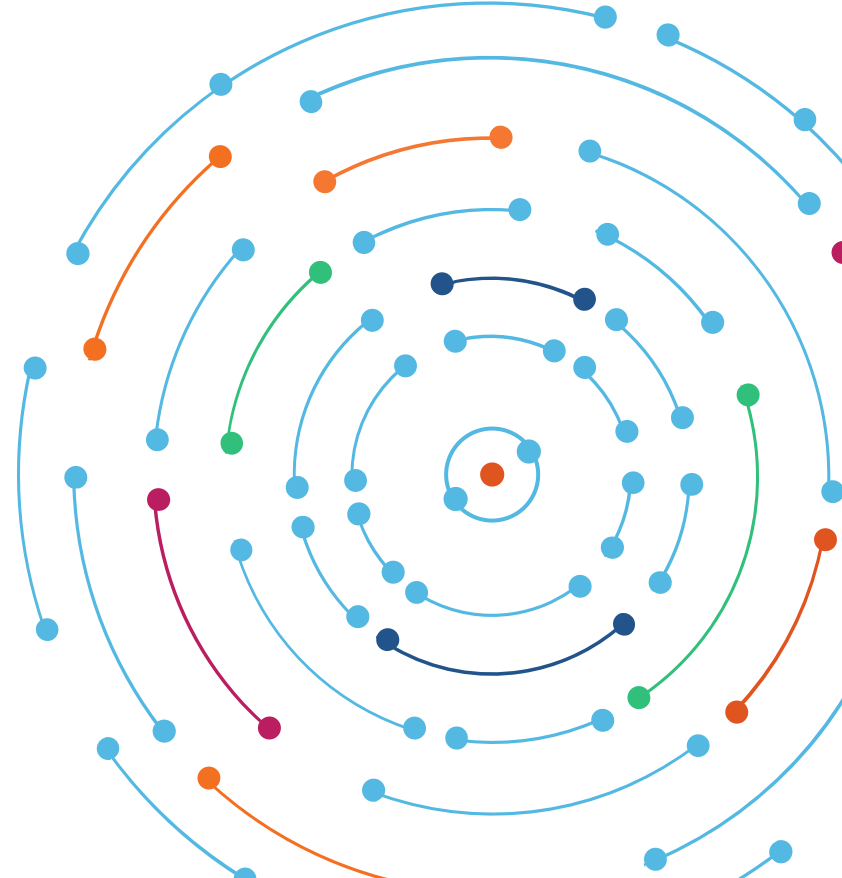
 Show/Hide

| Status | Service | Status Code | Response Size | Domain Lookup Time | Connect Time | Response Time | Avg HTTP Latency | Avg Latency | Avg Jitter | Packet Loss | |
|---------|--|-------------|---------------|--------------------|--------------|---------------|------------------|-------------|------------|-------------|---|
| Healthy |  ADP | 200 | 7 KB | 189.486 ms | 307.599 ms | 175.874 ms | 672.958 ms | 122.295 ms | 1.711 ms | 0.000 % |  |
| Healthy |  Bluejeans | 200 | 63 KB | 1.567 ms | 40.019 ms | 578.407 ms | 619.989 ms | 17.387 ms | 0.179 ms | 0.000 % |  |
| Healthy |  Box | 200 | 306 KB | 6.055 ms | 158.067 ms | 961.499 ms | 1,125.621 ms | 84.040 ms | 0.274 ms | 0.000 % |  |
| Healthy |  Cisco WebEx | 200 | 1 KB | 213.497 ms | 222.001 ms | 81.584 ms | 517.082 ms | 74.332 ms | 0.437 ms | 0.000 % |  |
| Healthy |  Dialpad | 200 | 207 KB | 24.020 ms | 134.965 ms | 772.081 ms | 931.067 ms | 3.515 ms | 0.176 ms | 0.000 % |  |
| Healthy |  Dropbox | 200 | 89 KB | 2.980 ms | 114.682 ms | 462.306 ms | 576.746 ms | 58.264 ms | 0.373 ms | 0.000 % |  |
| Healthy |  Expensify | 200 | 20 KB | 2.560 ms | 6.831 ms | 231.285 ms | 240.676 ms | 1.854 ms | 0.182 ms | 0.000 % |  |
| Healthy |  Github | 200 | 208 KB | 1.065 ms | 62.784 ms | 179.108 ms | 242.957 ms | 30.035 ms | 0.128 ms | 13.333 % |  |
| Healthy |  GitLab | 503 | 10 KB | 0.228 ms | 26.884 ms | 17.812 ms | 44.924 ms | 1.994 ms | 0.342 ms | 0.000 % |  |
| Healthy |  Gmail | 200 | 120 KB | 0.055 ms | 38.869 ms | 155.711 ms | 194.634 ms | 4.200 ms | 0.282 ms | 0.000 % |  |
| Healthy |  Google Docs | 200 | 102 KB | 0.073 ms | 38.106 ms | 148.087 ms | 186.266 ms | 4.310 ms | 0.416 ms | 0.000 % |  |
| Healthy |  Google Drive | 200 | 98 KB | 0.153 ms | 41.497 ms | 153.619 ms | 195.269 ms | 4.058 ms | 0.286 ms | 0.000 % |  |
| Healthy |  Kronos | 200 | 150 KB | 0.355 ms | 8.408 ms | 29.929 ms | 38.693 ms | 1.887 ms | 0.251 ms | 0.000 % |  |
| Healthy |  Office365 | 200 | 117 KB | 5.481 ms | 69.609 ms | 103.131 ms | 178.220 ms | 21.425 ms | 0.264 ms | 0.000 % |  |
| Healthy |  Salesforce.com | 200 | 9 KB | 140.320 ms | 338.032 ms | 143.617 ms | 621.969 ms | 111.055 ms | 0.236 ms | 0.000 % |  |
| Healthy |  ServiceNow | 200 | 262 KB | 37.453 ms | 12.489 ms | 259.536 ms | 308.122 ms | 4.224 ms | 0.121 ms | 0.000 % |  |
| Warning |  Teams | 200 | 191 KB | 13.975 ms | 182.480 ms | 481.926 ms | 678.381 ms | 55.304 ms | 1.918 ms | 0.000 % |  |

Synthetics tests enhances your flow based connectivity monitoring and analysis

- Continuous path monitoring with alerts shows your connectivity works as planned and alerts you when it does not
- Continuous monitoring of packet loss and jitter with alerts means you are already on it before your customers experience any degradation of latency or jitter sensitive services
 - Automation could be triggered by alerts from the tests and do it for you
- State of the internet measurements can help you quickly determine if an alarm from a test from your network to an internet destination is due to internet weather or if you need to take action inside your network.

Questions?





Thank you!

Nina
Peering person
nina@kentik.com

