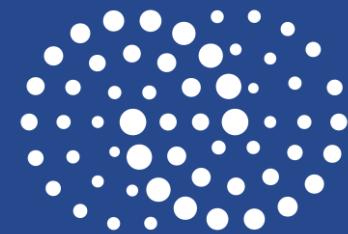
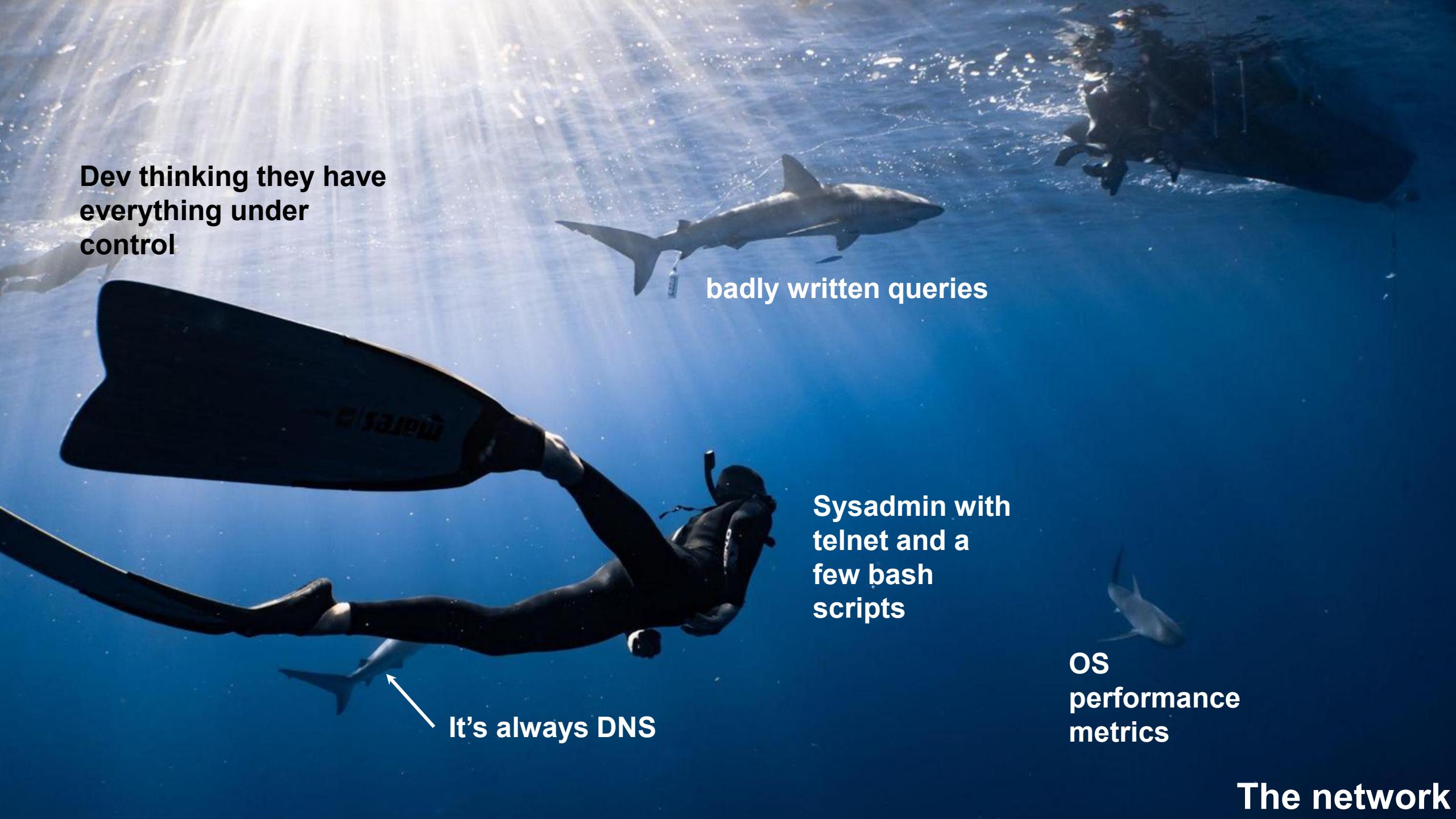


OBSERVABILITY



Back in
my day

A photograph of a diver in dark wetsuit and fins swimming in clear blue water. A large shark is swimming just below the surface behind the diver. Sunlight filters down from the surface in bright rays.

**Dev thinking they have
everything under
control**

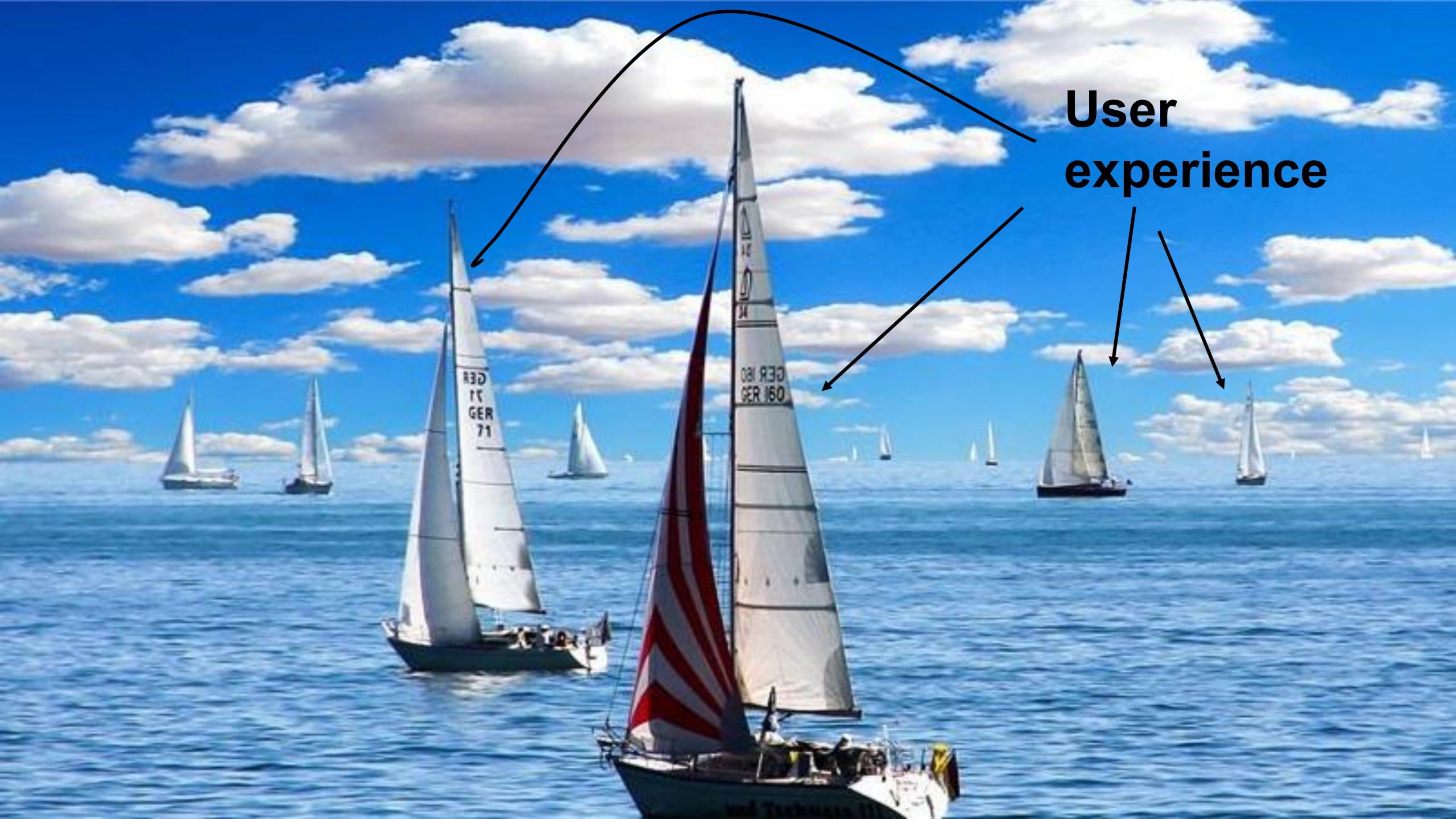
badly written queries

**Sysadmin with
telnet and a
few bash
scripts**

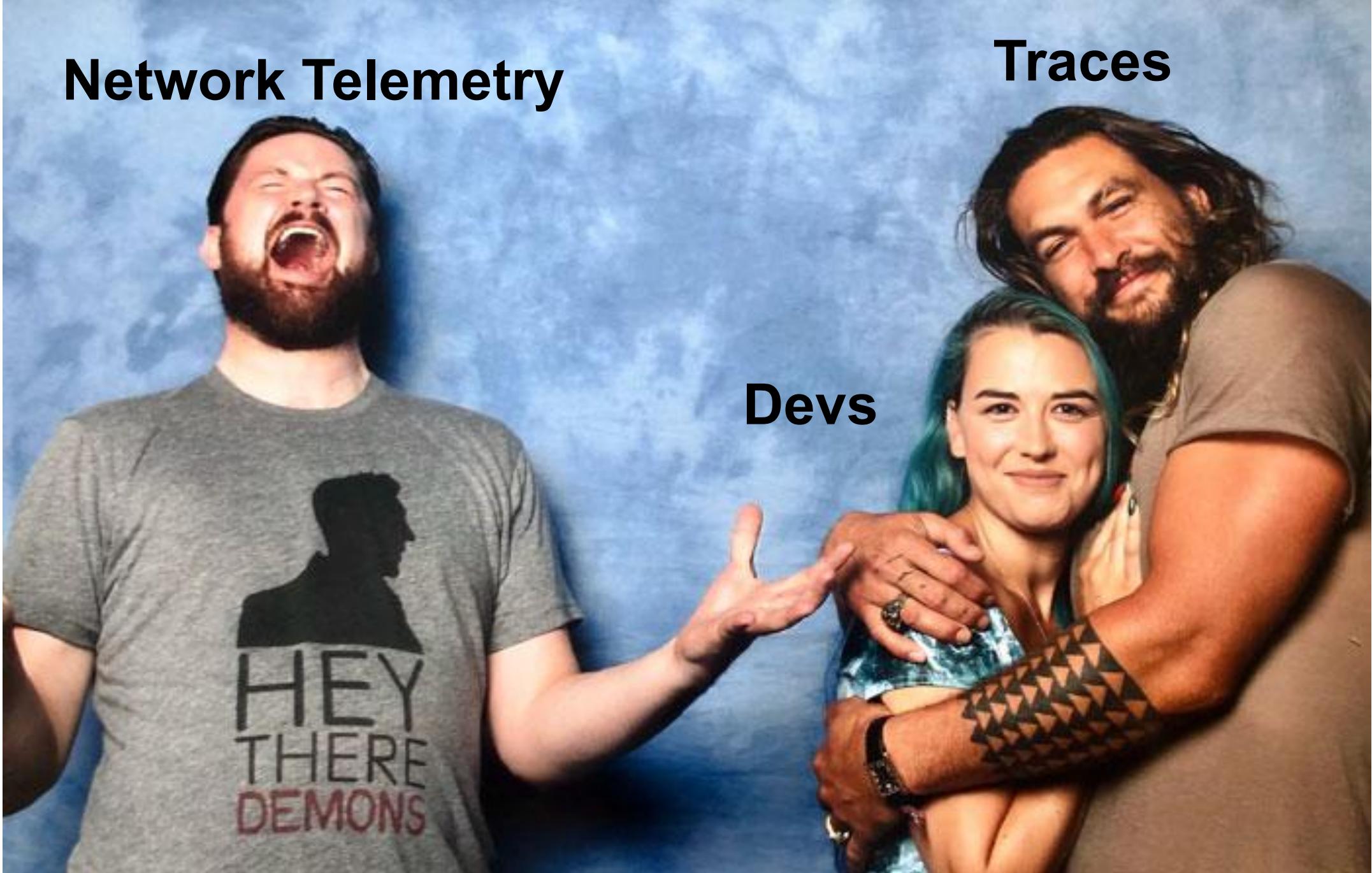
It's always DNS

**OS
performance
metrics**

The network



User
experience

A photograph of two people. On the left, a man with a beard and short dark hair is laughing heartily, his mouth wide open. He is wearing a grey t-shirt with a black graphic of a profile of a person's head facing right, and the text "HEY THERE DEMONS" printed below it. On the right, a woman with shoulder-length dark hair and blue-tinted highlights is hugging him from behind. She is wearing a tie-dye t-shirt and has a tattoo on her left upper arm. They are both smiling at the camera. The background is a plain, light blue.

Network Telemetry

Traces

Devs

Thou Shalt Love Thy Network

FOR THE LOVE OF PANTS!!!

**Learn how
IP addresses work!**



Is it the
Application?

Is it the
Network?

Network Observability

Overlooked, Underappreciated,
and More Important Than Ever

Leon Adato, Principal Technical Advocate



Principal Technical Advocate
at Catchpoint

- ~37 yrs: working in tech
- ~27 yrs: monitoring & o11Y
- ~11 yrs: Evangelist, Advocate, "Head Geek", etc.
- Tivoli, BMC, OpenView, janky perl scripts, SolarWinds, Nagios, batch files, Zabbix, Grafana, New Relic, and other assorted nightmare fuel.

@LeonAdato on all social media.

This is an Oyster Talk™



```
leon@leondesktop:~$ ping catchpoint.com
PING catchpoint.com (151.101.1.171) 56(84) bytes of data.
64 bytes from 151.101.1.171: icmp_seq=1 ttl=57 time=5.31 ms
64 bytes from 151.101.1.171: icmp_seq=2 ttl=57 time=5.14 ms
64 bytes from 151.101.1.171: icmp_seq=3 ttl=57 time=5.38 ms
64 bytes from 151.101.1.171: icmp_seq=4 ttl=57 time=4.92 ms
^C
--- catchpoint.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 4.918/5.187/5.383/0.178 ms
```

tv-netflix-problems-2011-07-06.pcap

No.	Time	Source	Destination	Protocol	Length	Info
343	65.142415	192.168.0.21	174.129.249.228	TCP	66	40555 → 80 [ACK] Seq=1 Ack=1 Win=5888 Len=0 TSval=491519346 TSecr=551811827
344	65.142715	192.168.0.21	174.129.249.228	HTTP	253	GET /clients/netflix/flash/application.swf?flash_version=flash_lite_2.1&v=1.5&n=
345	65.230738	174.129.249.228	192.168.0.21	TCP	66	80 → 40555 [ACK] Seq=1 Ack=188 Win=6864 Len=0 TSval=551811850 TSecr=491519347
346	65.240742	174.129.249.228	192.168.0.21	HTTP	828	HTTP/1.1 302 Moved Temporarily
347	65.241592	192.168.0.21	174.129.249.228	TCP	66	40555 → 80 [ACK] Seq=188 Ack=763 Win=7424 Len=0 TSval=491519446 TSecr=551811852
348	65.242532	192.168.0.21	192.168.0.1	DNS	77	Standard query 0x2188 A cdn-0.netfliximg.com
349	65.276870	192.168.0.1	192.168.0.21	DNS	489	Standard query response 0x2188 A cdn-0.netfliximg.com CNAME images.netflix.com.edge
350	65.277992	192.168.0.21	63.80.242.48	TCP	74	37063 → 80 [SYN] Seq=0 Win=5840 Len=0 MSS=1460 SACK_PERM=1 TSval=491519482 TSecr
351	65.297757	63.80.242.48	192.168.0.21	TCP	74	80 → 37063 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 SACK_PERM=1 TSval=3295
352	65.298396	192.168.0.21	63.80.242.48	TCP	66	37063 → 80 [ACK] Seq=1 Ack=1 Win=5888 Len=0 TSval=491519502 TSecr=3295534130
353	65.298687	192.168.0.21	63.80.242.48	HTTP	153	GET /us/nrd/clients/flash/814540.bun HTTP/1.1
354	65.318730	63.80.242.48	192.168.0.21	TCP	66	80 → 37063 [ACK] Seq=1 Ack=88 Win=5792 Len=0 TSval=3295534151 TSecr=491519503
355	65.321733	63.80.242.48	192.168.0.21	TCP	1514	[TCP segment of a reassembled PDU]

> Frame 349: 489 bytes on wire (3912 bits), 489 bytes captured (3912 bits)
 > Ethernet II, Src: Globalsc_00:3b:0a (f0:ad:4e:00:3b:0a), Dst: Vizio_14:8a:e1 (00:19:9d:14:8a:e1)
 > Internet Protocol Version 4, Src: 192.168.0.1, Dst: 192.168.0.21
 > User Datagram Protocol, Src Port: 53 (53), Dst Port: 34036 (34036)

▼ Domain Name System (response)

[Request In: 348]

[Time: 0.034338000 seconds]

Transaction ID: 0x2188

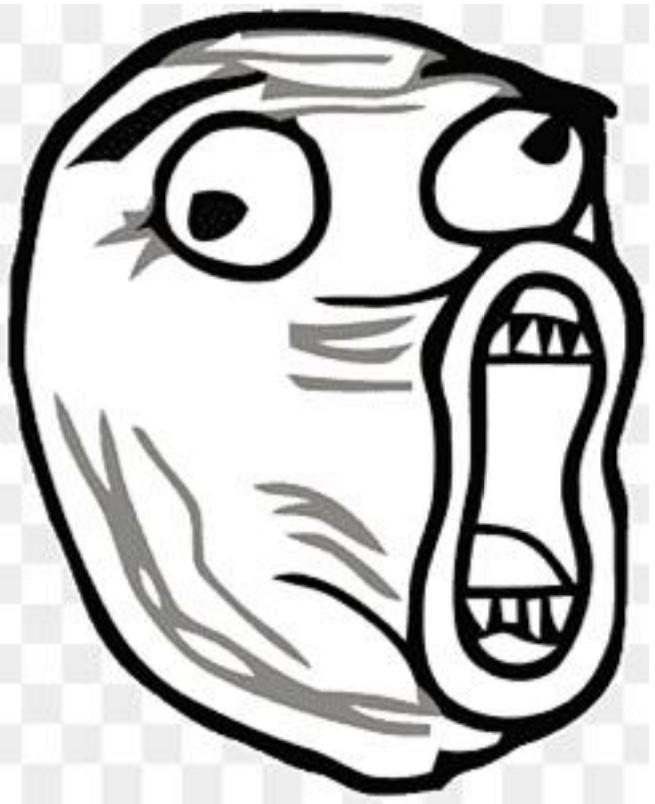
> Flags: 0x8100 Standard query response, No error

Questions: 1

Answer RRs: 4

Authority RRs: 9

Additional RRs: 9



OBSERVABILITY

Let's add a little nuance

Observability

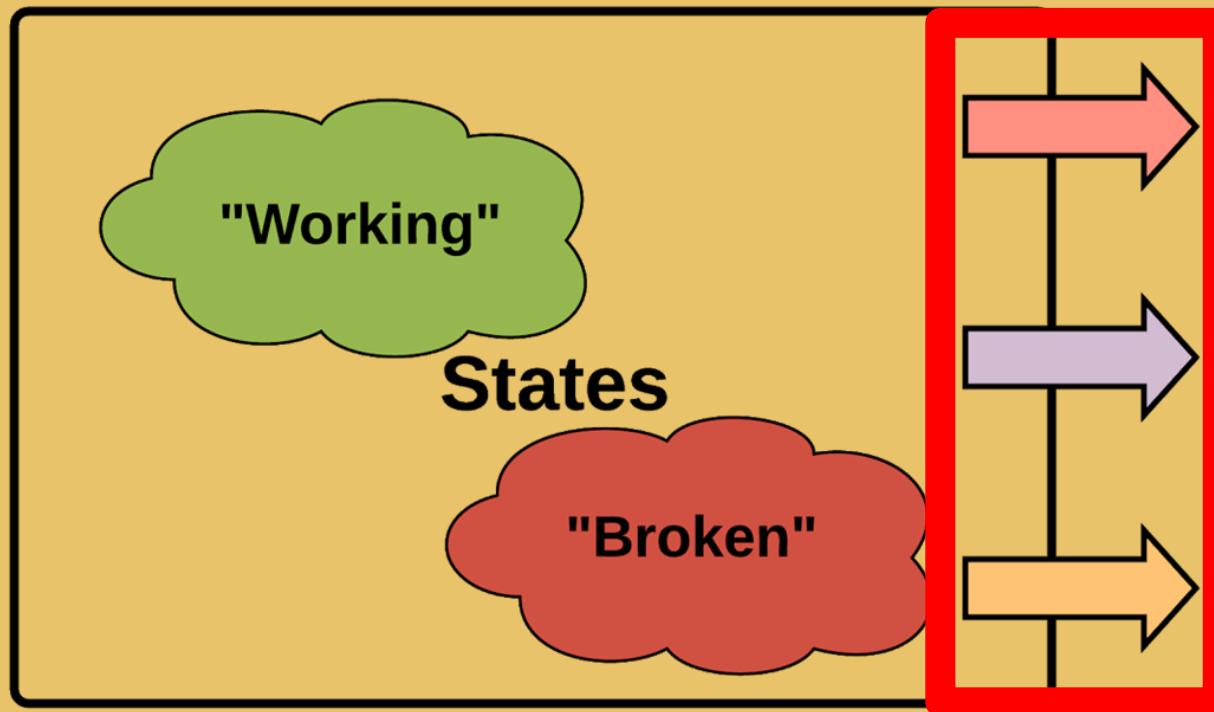
- Un-Known Unknowns
- High cardinality
- Correlation baked-in
- Golden signals
(latency, traffic, errors, saturation)

Monitoring

- Known Unknowns
- All cardinalities welcome
- (mostly) manual correlation
- Domain-specific signals

Observability

System



Monitoring ??

Outputs

SUPPORTING APPLICATIONS

WITH NETWORK OBSERVABILITY





Hold up...

1980s Internet

"No Comment....."

WORLD

1990s Internet

"YOU GOT MAIL"



2000s Internet

"BROADCAST YOURSELF"



2010s Internet

(Early 2010s-Mid 2010s)

"Noice!"



2017 Internet

"This is Fine...Right?"



2018-2019 Internet

"F*CK YOU, YOUTUBE REWIND 2018."

"But hey at least we have good memes from 2018-2019"



EARLY-2020s INTERNET

"GOT DAMN!!!!!!!"



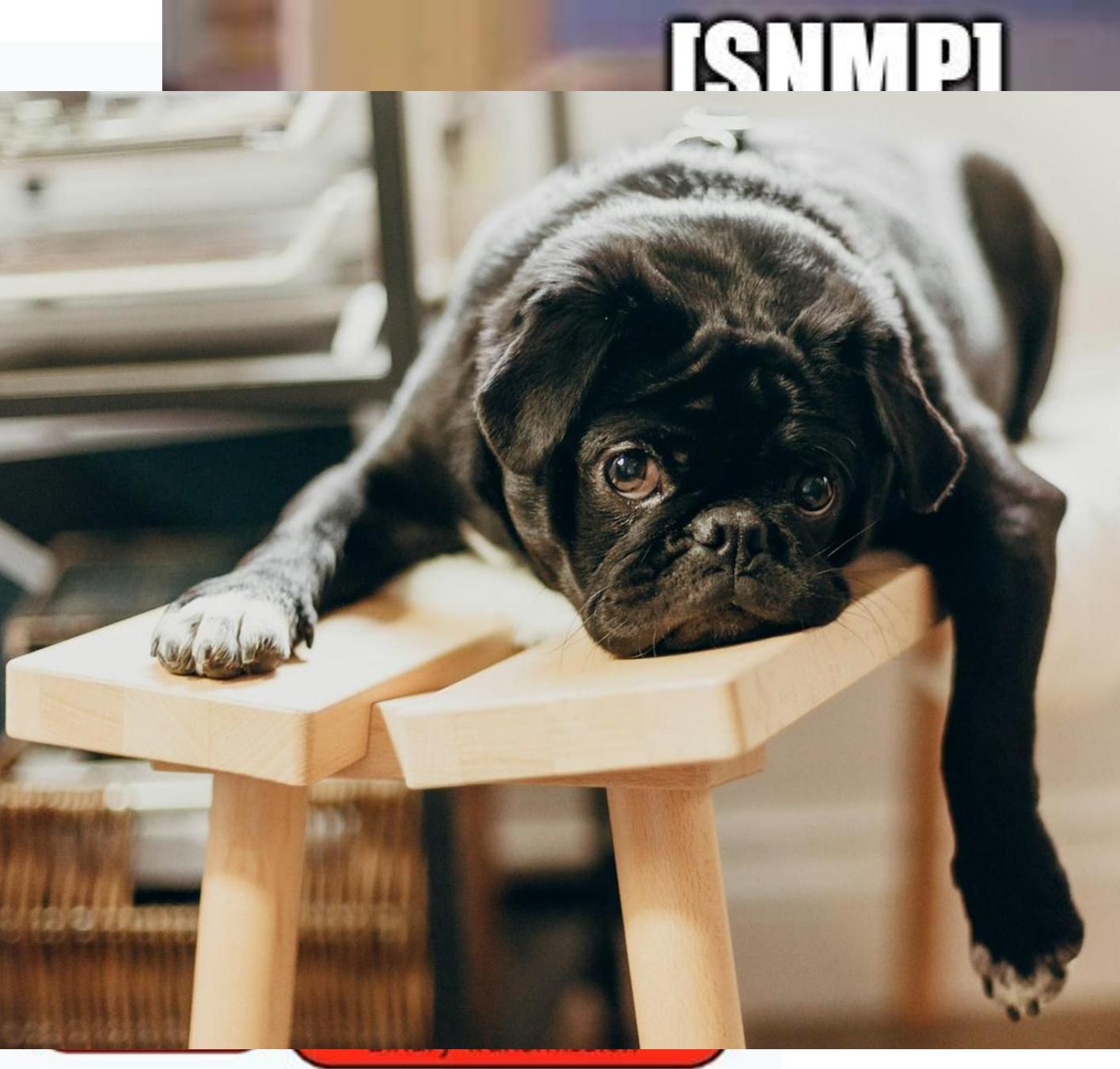
2024 INTERNET

(So Far)

"Really...Still January" "Sighs"



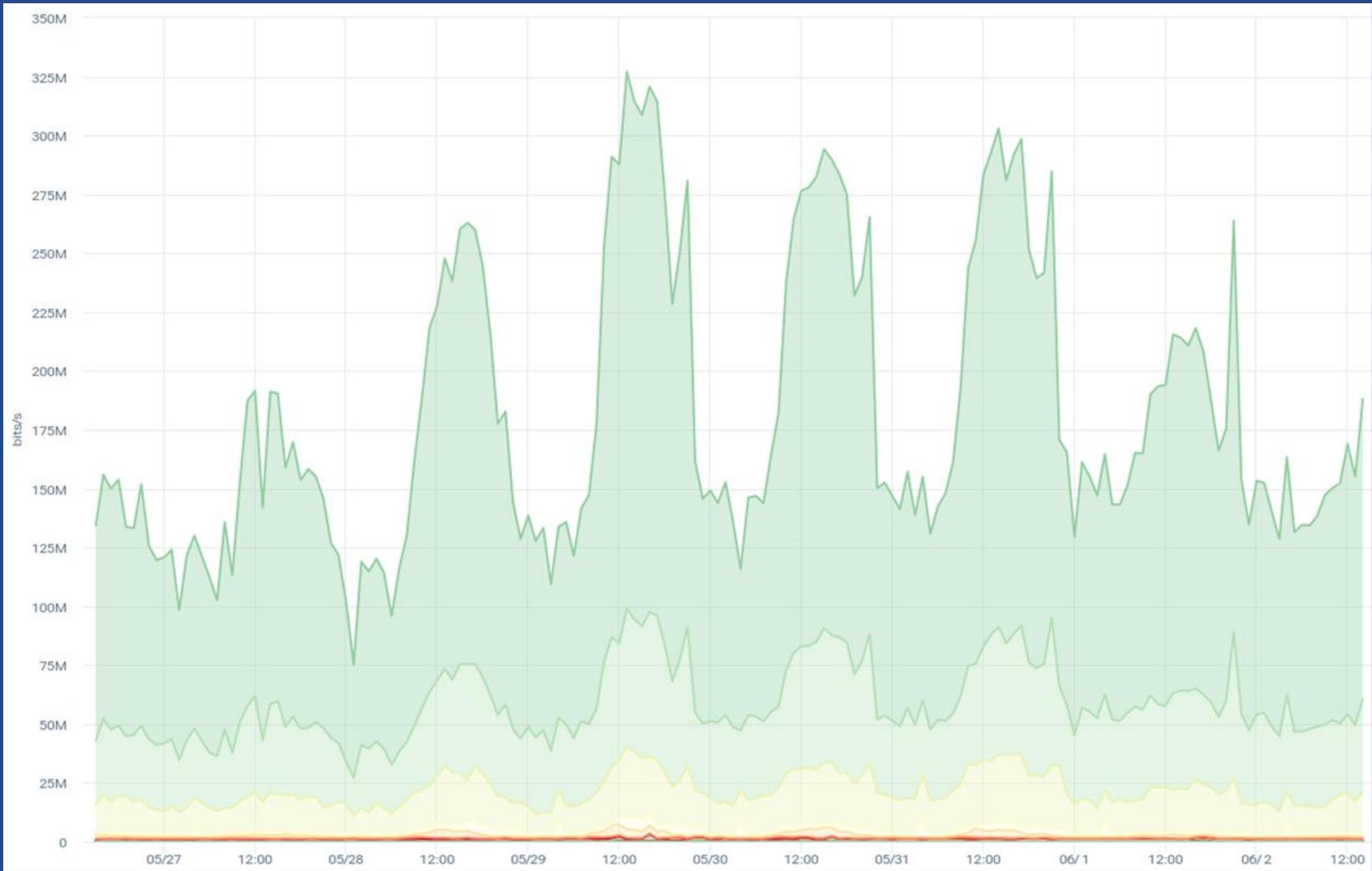
Media Layers Host Layers



[SNMPI]

CANDLE PROBLEM





kappalab1

remoteanything

zeroconf

http

ssh

https

upnp

db-lsp-disc

domain

netbios-dam

zeroconf

http

ssh

https

upnp

db-lsp-disc

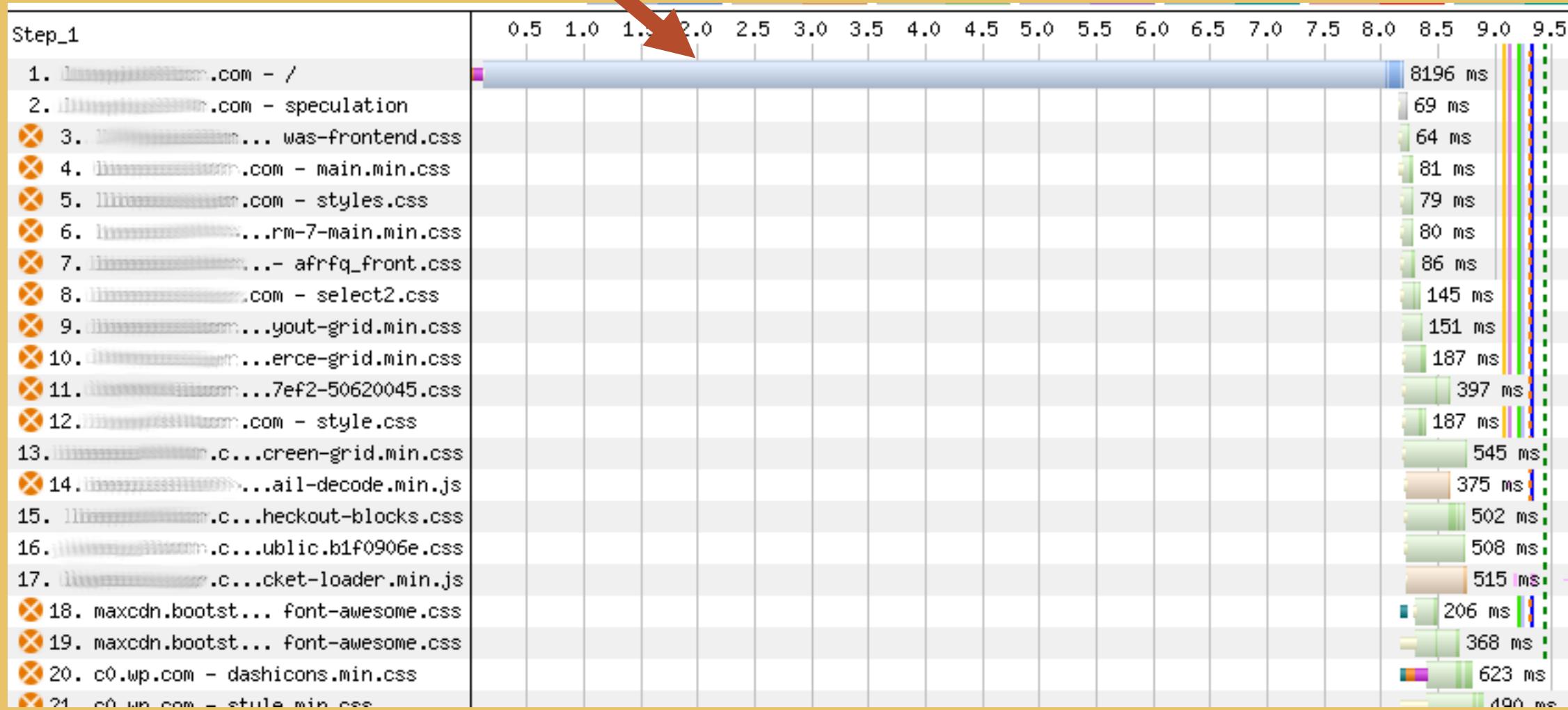
domain

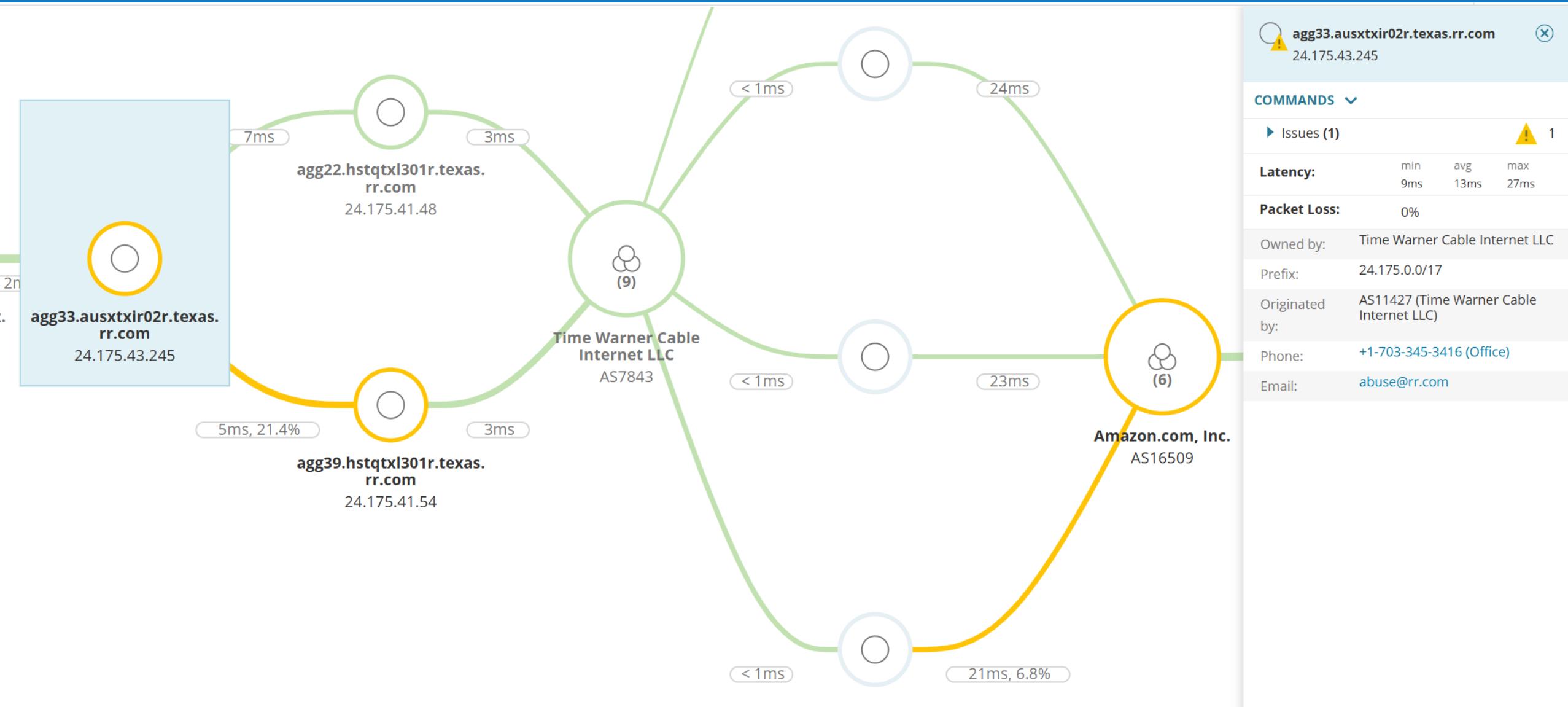
netbios-dam

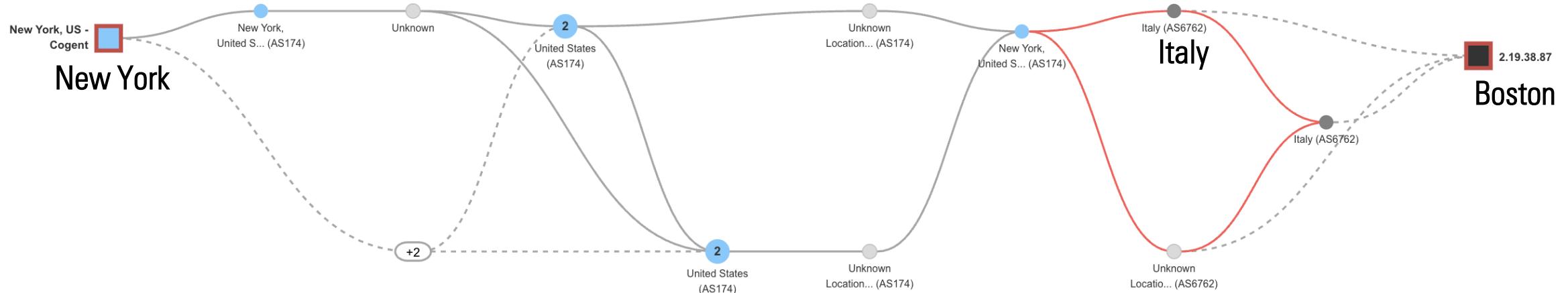
TTFB

8.046 s

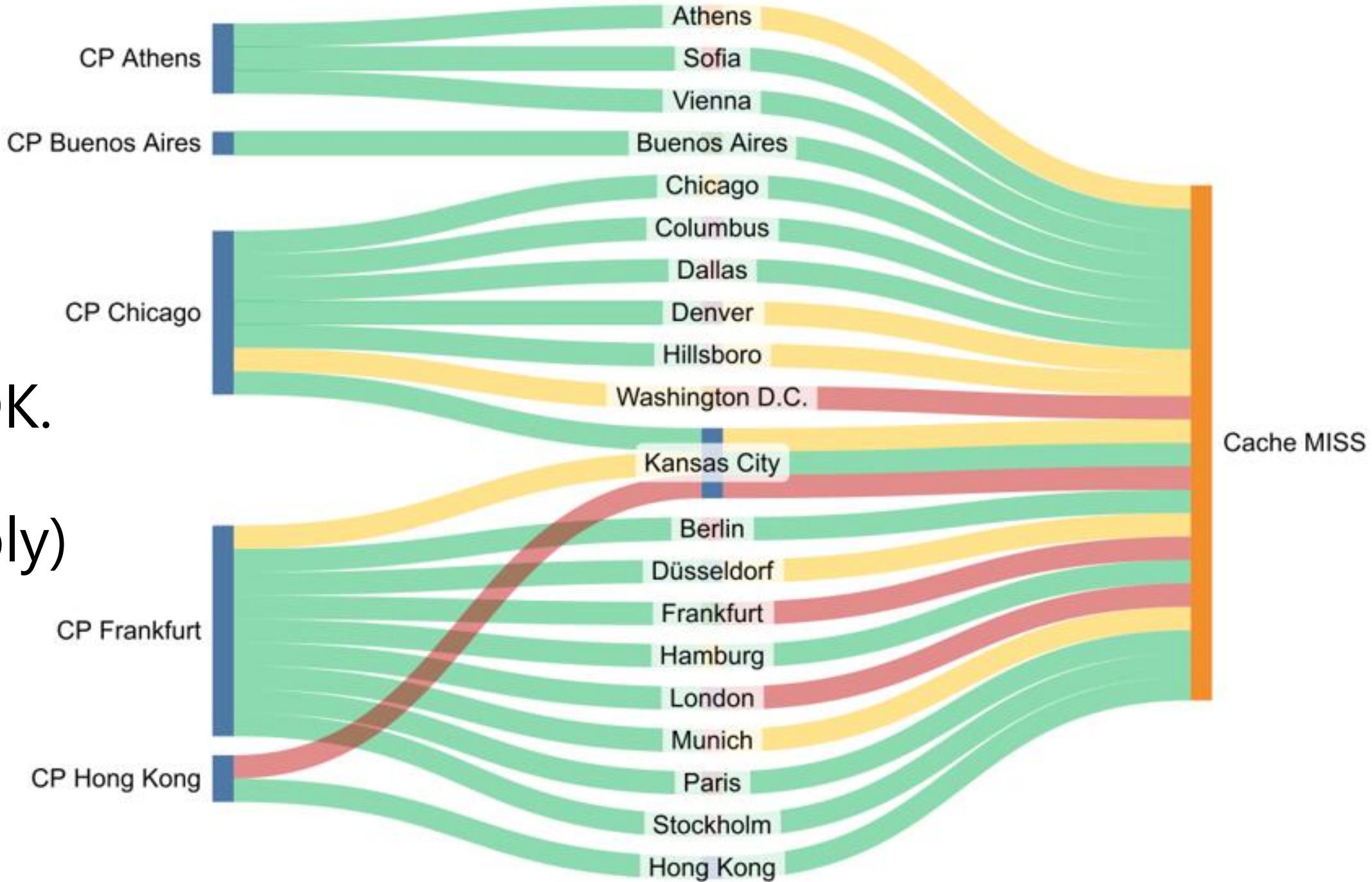
(TTFB = "Time To First Byte")





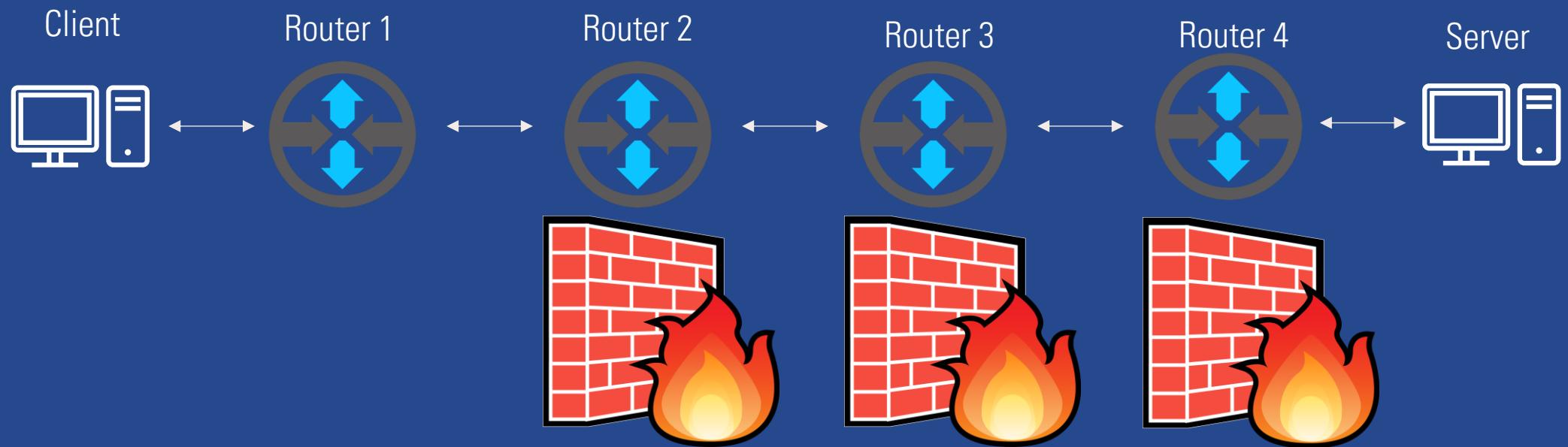


This is
never OK.
(probably)



```
leon@leondesktop:~$ traceroute catchpoint.com
traceroute to catchpoint.com (151.101.129.171), 30 hops max, 60 byte packets
1 _gateway (192.168.101.1)  0.346 ms  0.328 ms  0.399 ms
2 172.16.1.254 (172.16.1.254)  1.292 ms  1.492 ms  1.000 ms
3 108-249-10-1.lightspeed.bcvloh.sbcglobal.net (108.249.10.1)  2.132 ms  2.179 ms  1.845 ms
4 71.151.93.74 (71.151.93.74)  2.839 ms  2.013 ms  1.777 ms
```

```
leon@leondesktop:~$ traceroute catchpoint.com
traceroute to catchpoint.com (151.101.129.171), 30 hops max, 60 byte packets
1 _gateway (192.168.101.1) 0.346 ms 0.328 ms 0.399 ms
2 172.16.1.254 (172.16.1.254) 1.292 ms 1.492 ms 1.000 ms
3 108-249-10-1.lightspeed.bcvloh.sbcglobal.net (108.249.10.1) 2.132 ms 2.179 ms 1.845 ms
4 71.151.93.74 (71.151.93.74) 2.839 ms 2.013 ms 1.777 ms
5 * * *
6 32.130.106.159 (32.130.106.159) 3.463 ms 2.284 ms 2.291 ms
7 * * *
8 * * *
9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
```



Can I ping a cloud service?

No, not by using the normal "ping"/ICMP protocol. The ICMP protocol is not permitted through the Azure load balancer.

To test connectivity, we recommend that you do a port ping. While Ping.exe uses ICMP, you can use other tools, such as PSPing, Nmap, and telnet, to test connectivity to a specific TCP port.

For more information, see [Use port pings instead of ICMP to test Azure VM connectivity](#).



Can I ping a cloud service?

No, not by using the normal "ping"/ICMP protocol.

```
leon@leondesktop:~$ sudo ./cp_traceroute -T catchpoint.com
traceroute to catchpoint.com(151.101.129.171), 30 hops max, 60 byte packets, overall timeout not set
 1 * _gateway (192.168.101.1)  0.326 ms *
 2 * 172.16.1.254 (172.16.1.254)  0.694 ms *
 3 * * *
 4 * * *
 5 * * *
 6 32.130.106.159 (32.130.106.159)  3.099 ms  2.988 ms  2.766 ms
 7 12.55.233.18 (12.55.233.18)  5.379 ms  5.445 ms  5.265 ms
 8 151.101.129.171 (151.101.129.171)  21.533 ms  12.028 ms  25.891 ms
Timeout: false
Duration: 44.451 ms
DestinationReached: true
```

Pietrasanta Traceroute 

 MTR (Matt's TRaceroute)

My traceroute [v0.95]								2025-08-24T17:49:24-0400		
Keys: Help Display mode Restart statistics Order of fields								quit		
								Packets		
								Pings		
Host								Loss% Snt Last Avg Best Wrst StDev		
1. _gateway								8.4% 95 0.3 0.3 0.2 1.3 0.1		
2. 172.16.1.254								4.2% 95 1.0 0.9 0.5 3.0 0.3		
3. 108-249-10-1.lightspeed.bcvloh.sbcglobal.net								0.0% 95 1.7 1.7 1.0 2.4 0.3		
4. 71.151.93.74								0.0% 95 1.9 1.8 1.4 2.8 0.3		
5. (waiting for reply)										
6. 32.130.106.159								0.0% 95 3.0 2.8 2.0 3.9 0.3		
7. (waiting for reply)										
8. 151.101.193.171								0.0% 94 17.7 17.9 17.4 21.2 0.4		



Let's replace
everything
with Network
Observ...

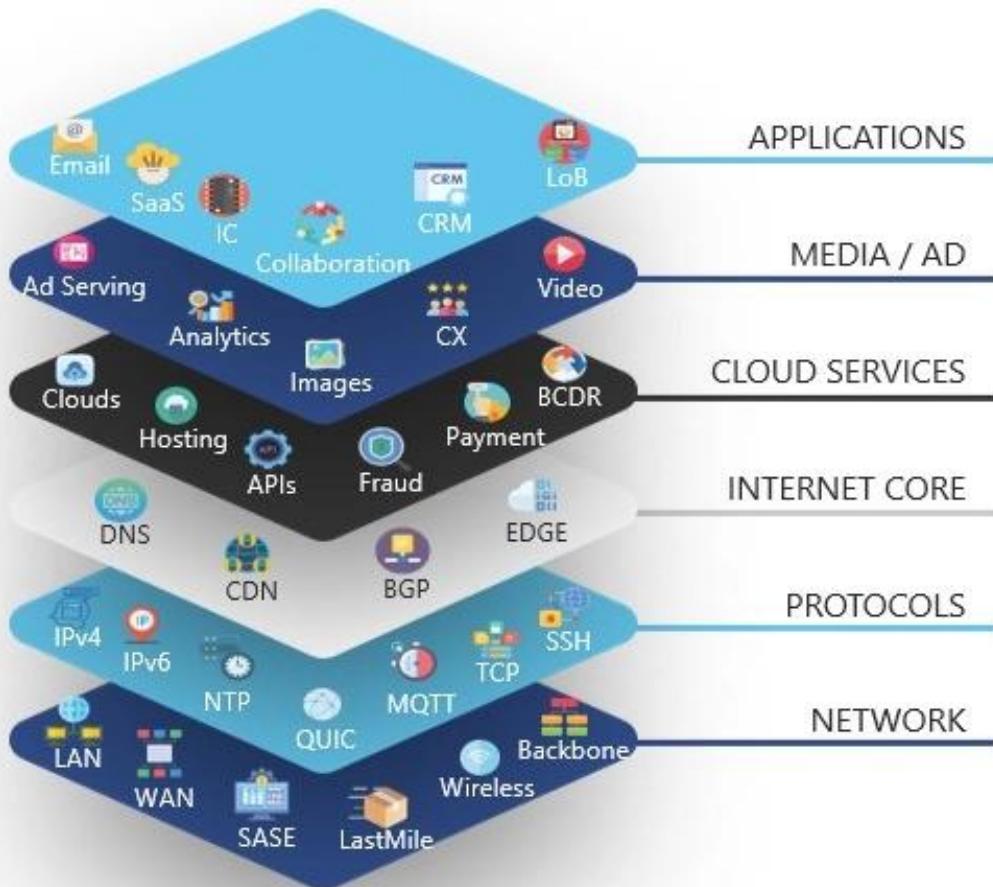


NO!

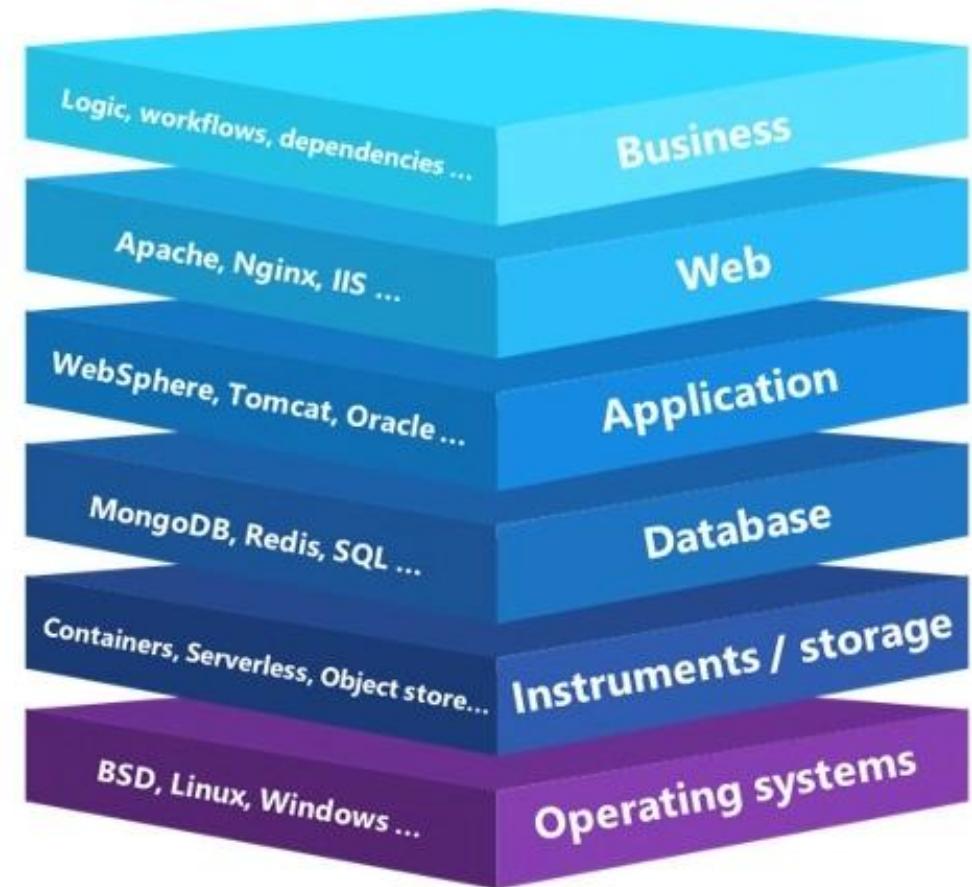


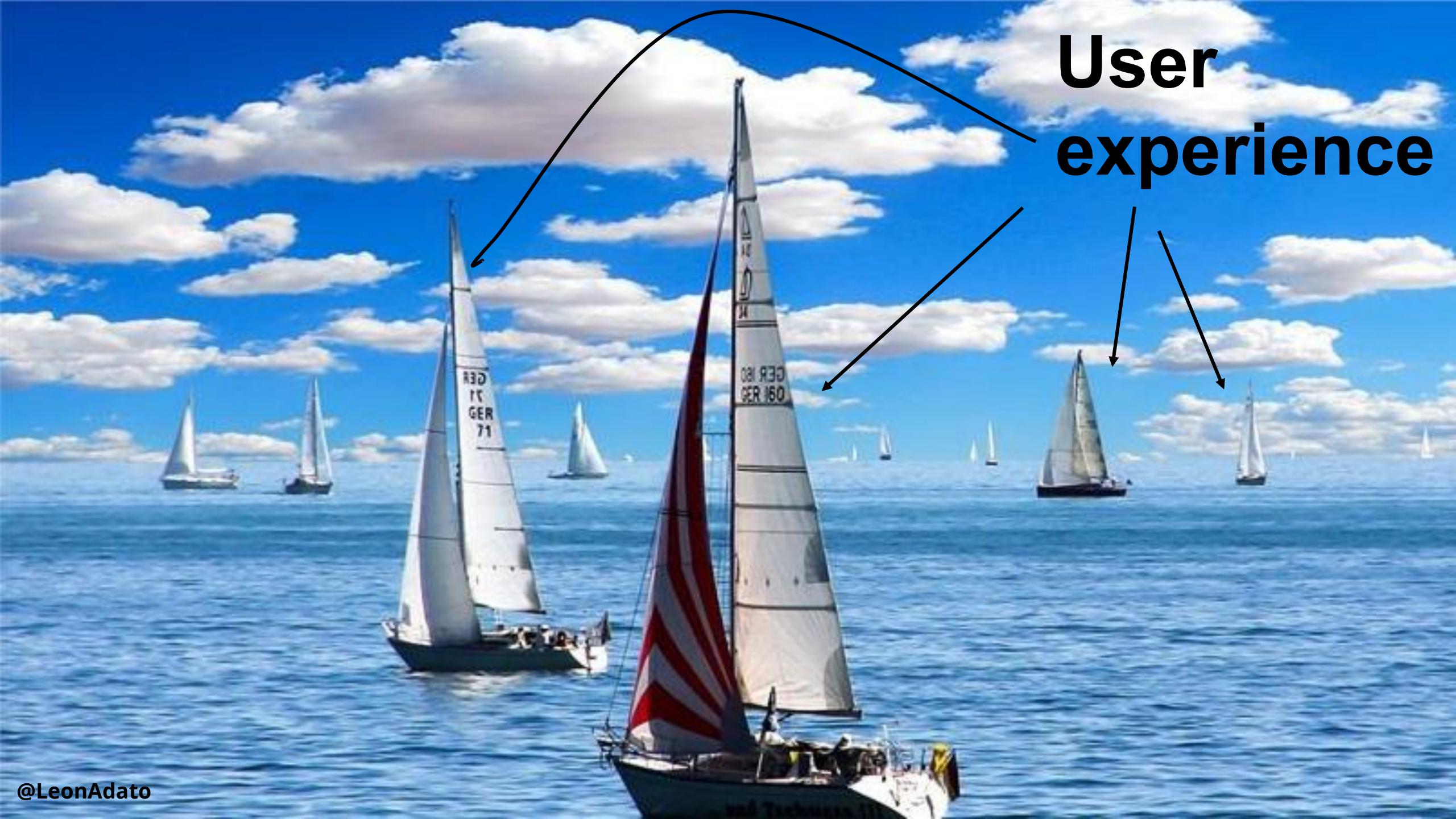
Network Observability is NOT

IPM for Internet Stack



APM for Application Stack



A photograph of a sailboat race on a bright, sunny day. Numerous sailboats of various sizes are scattered across a deep blue sea under a sky filled with white and grey cumulus clouds. In the foreground, two sailboats are prominent: one with a white sail featuring red and white stripes, and another with a white sail featuring black text that reads "RED IT GER 71". A third sailboat is visible behind them. Several other sailboats are scattered across the horizon. The overall scene is one of a lively maritime event.

**User
experience**

o11y / Monitoring Tools



Management Tools



A close-up shot from a movie. On the right, a man wearing a black hooded robe and a black mask over his eyes is looking towards the left. On the left, the back of a woman's head and hair are visible, showing blonde hair. The background is dark and out of focus.

Anyone who says
otherwise is selling
something



NEW
or IMPROVED



@LeonAdato

THREE PILLARS OF NETWORK MONITORING

NETWORK TRAFFIC ANALYTICS



Network Flow

SYNTHETIC TESTING



Digital Experience Monitoring

INFRASTRUCTURE METRICS



Network Monitoring Systems

THREE PILLARS OF NETWORK MONITORING

NETWORK TRAFFIC ANALYTICS



Network Flow

SYNTHETIC TESTING

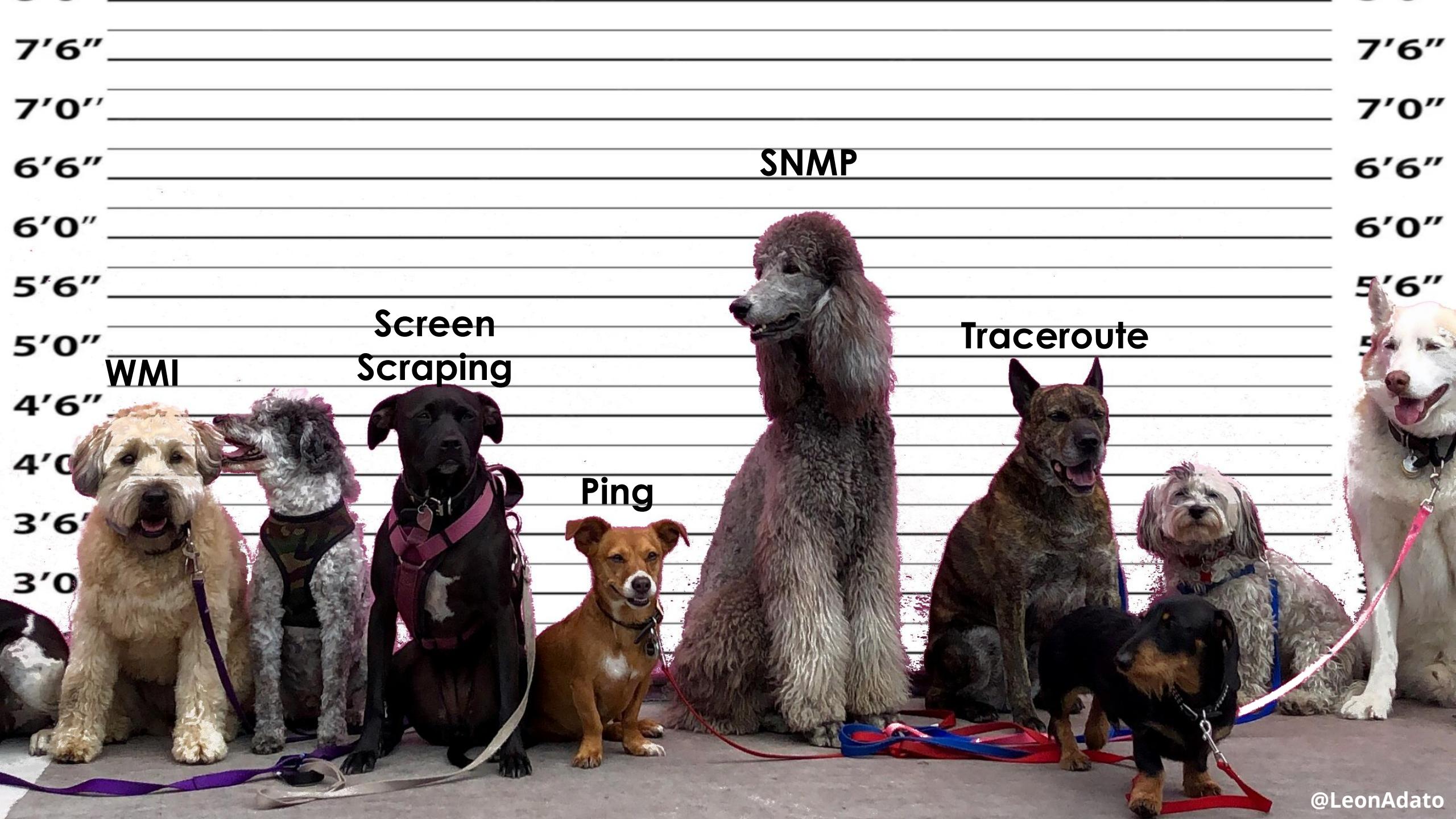


Digital Experience Monitoring

INFRASTRUCTURE METRICS



Network Monitoring Systems



7'6"

7'6"

7'0"

7'0"

6'6"

SNMP

6'0"

6'0"

5'6"

5'6"

5'0"

WMI

**Screen
Scraping**

4'6"

Traceroute

4'0"

Ping

3'6"

5'

3'0"

@LeonAdato

▶ https://api.cisco.com/supporttools/eox/rest/{version}/EOXByProductID/{pageIndex}/{productIDs}

Examples 0 ▼ BUILD

GET

https://api.cisco.com/supporttools/eox/rest/:version/EOXByProductID/:pageIndex/:productIDs?responseencoding=&

Send

Save

Params ● Authorization ● Headers (8) Body Pre-request Script Tests Settings

Cookies Code

KEY	VALUE	DESCRIPTION
<input checked="" type="checkbox"/> responseencoding		
<input checked="" type="checkbox"/> Key		

Path Variables

KEY	VALUE
version	
pageIndex	
productIDs	

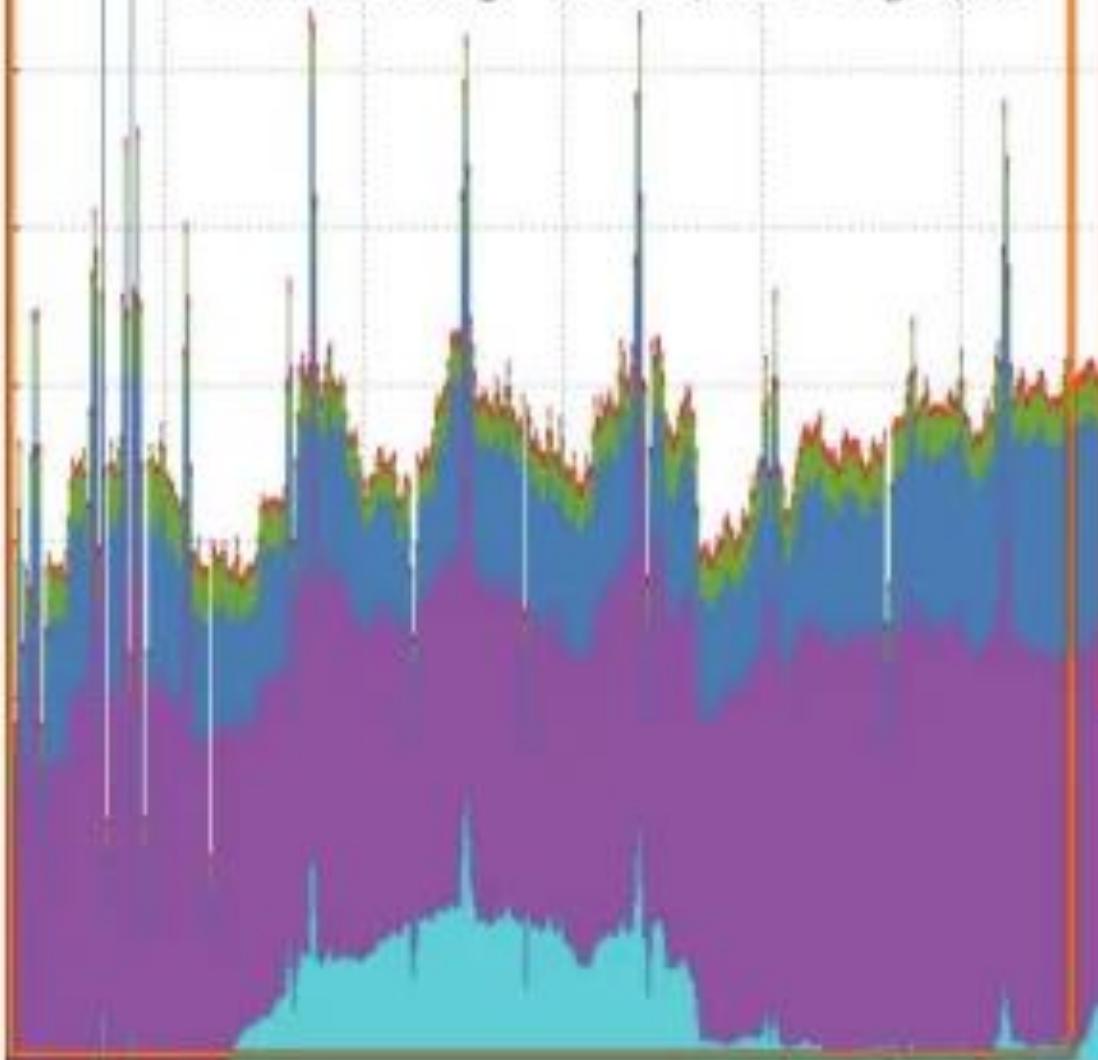
Body Cookies Headers (12) Test Results

Pretty Raw Preview Visualize JSON

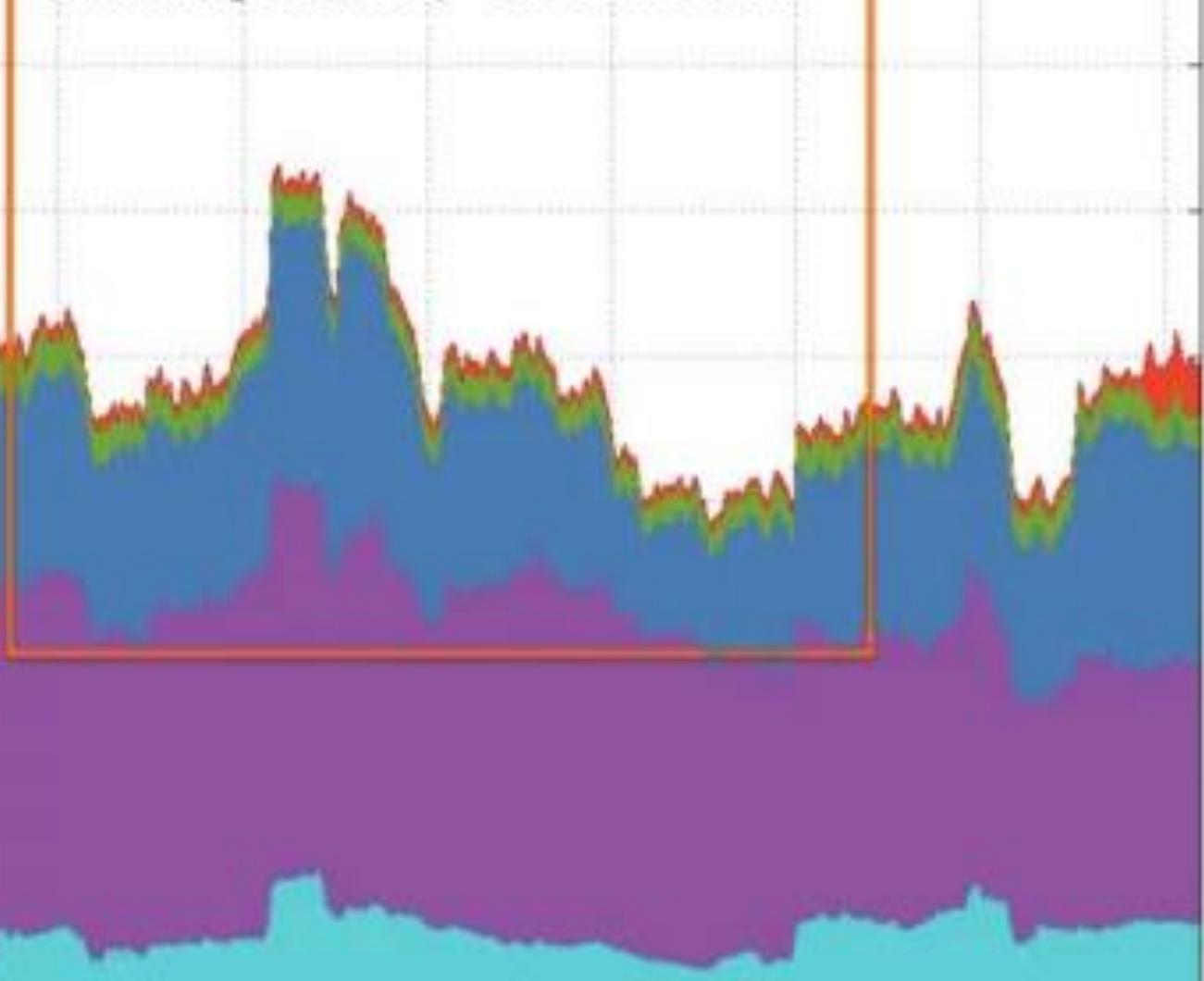
```
1  {
2      "PaginationResponseRecord": {
3          "PageIndex": 1,
4          "LastIndex": 1,
5          "TotalRecords": 2,
6          "PageRecords": 2
7      },
8      "EOXRecord": [
9          {
10             "EOLProductID": "WIC-1T=",
11             "ProductIDDescription": "1-Port Serial WAN Interface Card",
12             "ProductBulletinNumber": "EOL6640",
13             "LinkToProductBulletinURL": "http://www.cisco.com/en/US/prod/collateral/routers/ps5854/eol_c51_513300.html",
14             "EOXExternalAnnouncementDate": {
15                 "value": "2008-12-28",
16                 "dateFormat": "YYYY-MM-DD"
17             },
18             "EndOfSaleDate": {
19                 "value": "2009-12-28",
20                 "dateFormat": "YYYY-MM-DD"
21             },
22             "EndOfSWMaintenanceReleases": {
23                 "value": "2010-12-28",
24                 "dateFormat": "YYYY-MM-DD"
25             }
26         }
27     ]
28 }
```

be1
af1
af2
af3
af4
nc1

SNMP caching – more spikes on graphs



Streaming telemetry – smoother data



THREE PILLARS OF NETWORK MONITORING

NETWORK TRAFFIC ANALYTICS



Network Flow

SYNTHETIC TESTING



Digital Experience Monitoring

INFRASTRUCTURE METRICS



Network Monitoring Systems

Network Telemetry



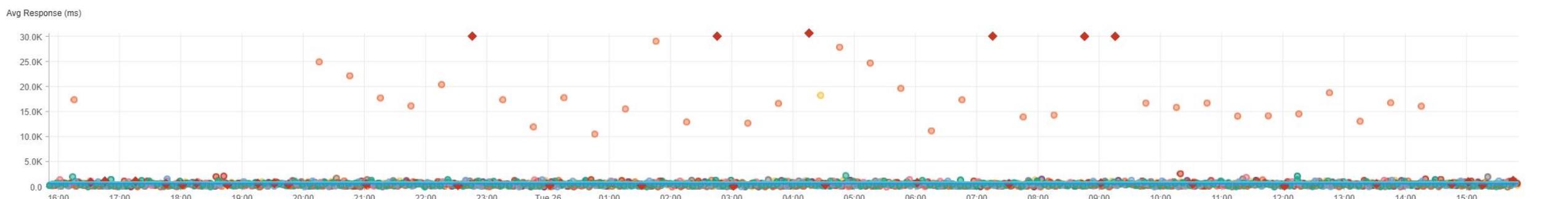
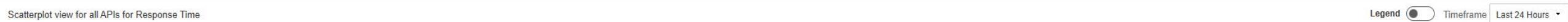
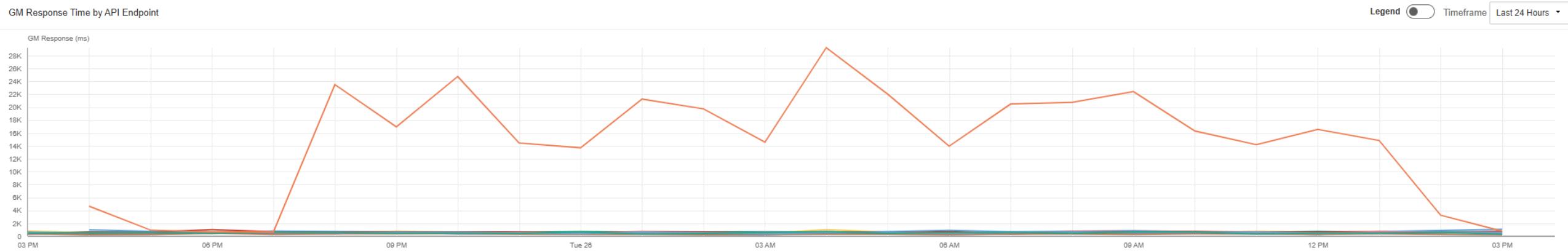
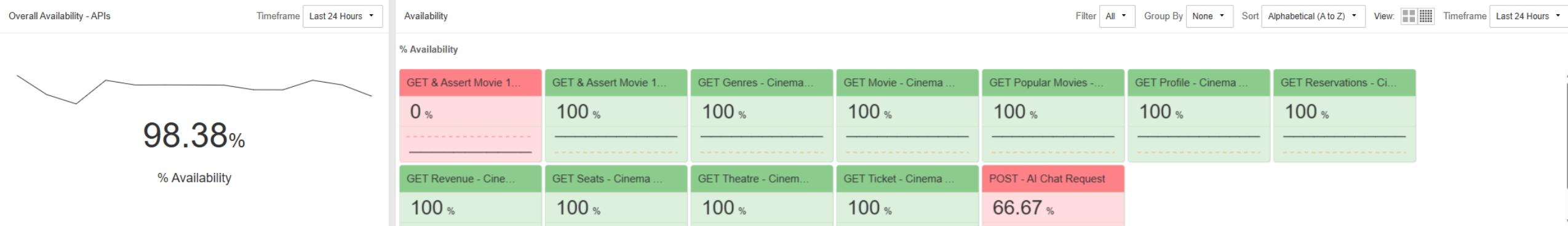
DevOps

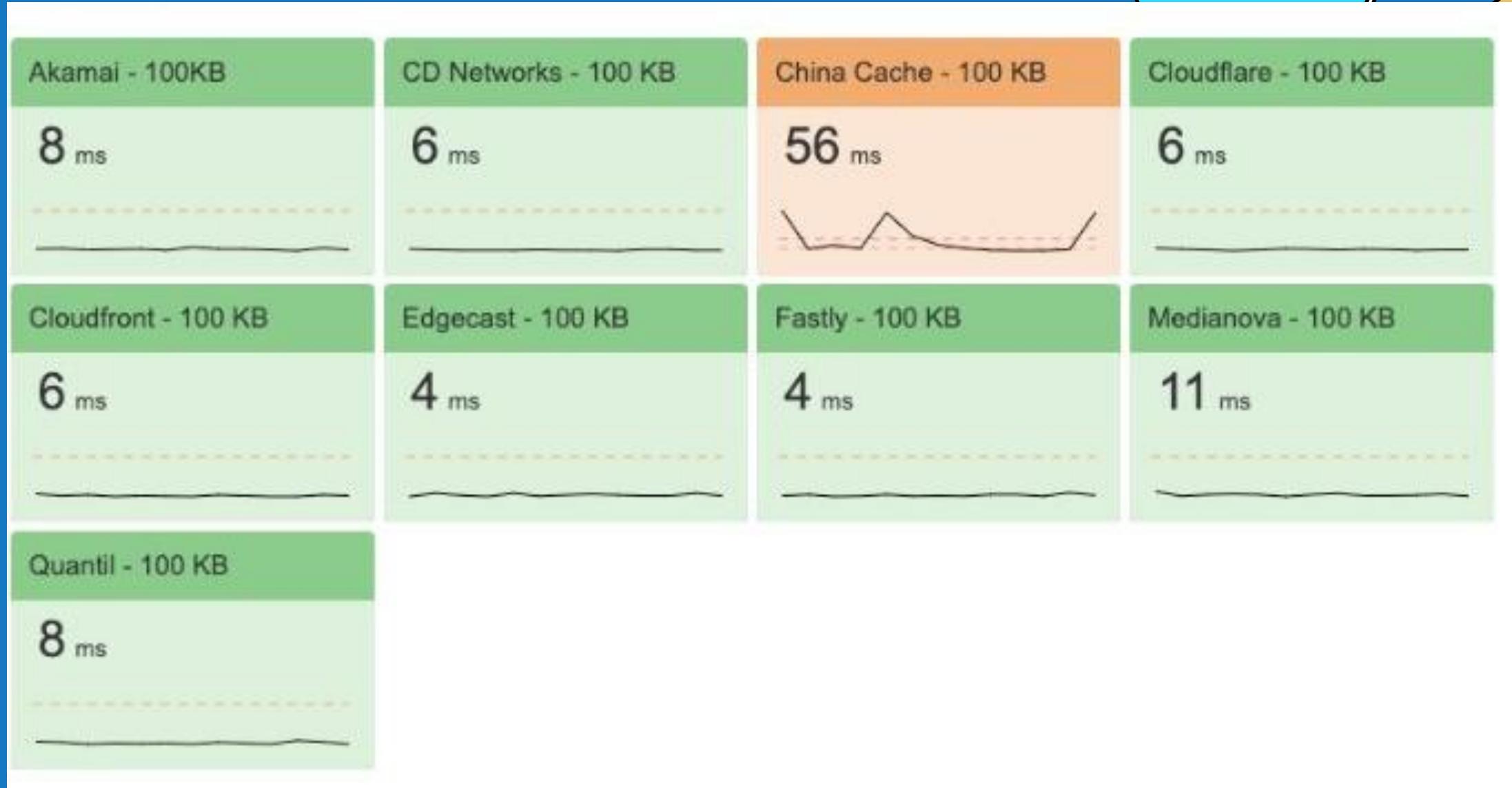
Synthetic Transactions





A Child's Garden of Synthetic Transactions







Web

Examines a single webpage and offers crucial insight to the performance of your webpage.

[HTTP](#)[Emulated](#)[Playback](#)[Mobile Playback](#)[Chrome \(New\)](#)[Chrome](#)[Mobile](#)[Edge](#)

Transaction !

Similar to Web Test, transaction tests allows using Selenium language to record transactions and examine multiple webpages.

[Emulated](#)[Chrome](#)[Mobile](#)

Playwright

Playwright test allows using playwright scripts to record transactions and examine web pages.

[Edge](#)[Chrome](#)

Puppeteer

Puppeteer test allows using Puppeteer scripts to record transactions and examine web pages.

[Chrome](#)

WebPageTest

Examines a series of web pages and offers crucial insights into the performance of your web site.

[WebPageTest](#)

HTML Code

Examines HTML code without first requesting it from the server. Perfect to test HTML code performance in a test environment.

[Emulated](#)[Chrome](#)[Mobile](#)

API

Examines a URL; and parse its XML or JSON responses. Use Selenium or JavaScript to record transactions and examine multiple URL's.

[API](#)

Web Socket

Monitor WebSockets by establishing a connection, sending data, asserting the server response, and creating custom metrics based on the response.

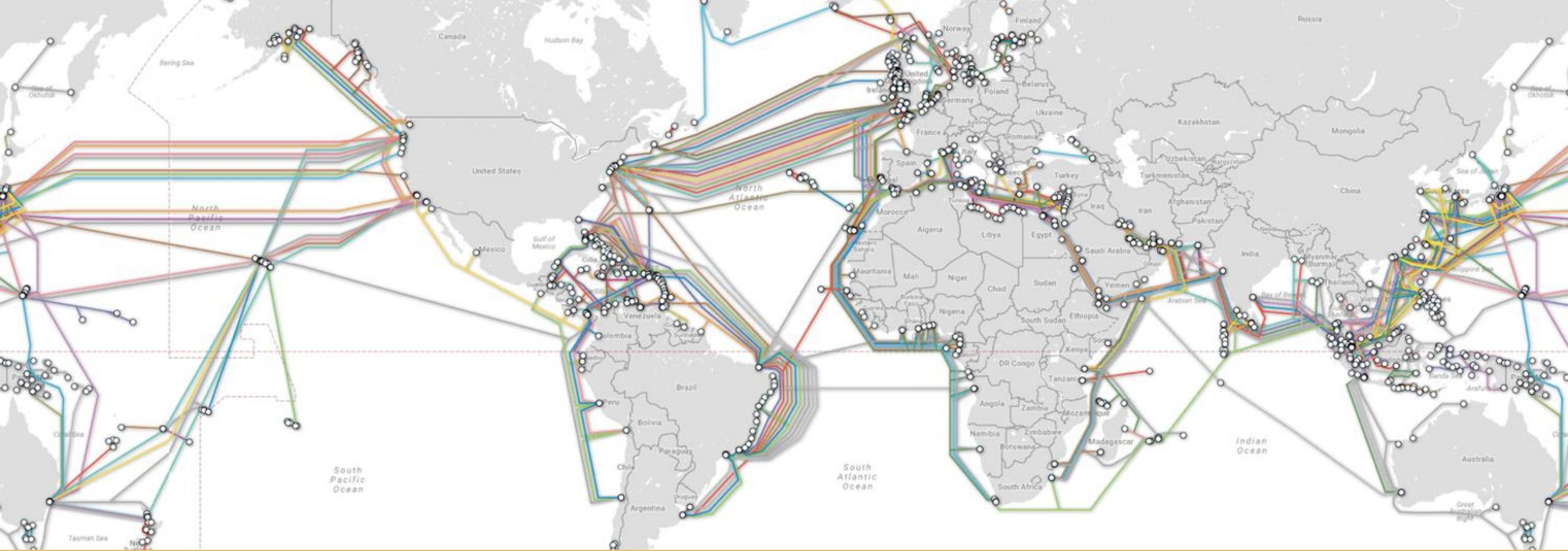
[Web Socket](#)

Streaming

Streaming test uses an open source video player embedded into Chrome browser. This is used to control video and play the stream while capturing the performance metrics.

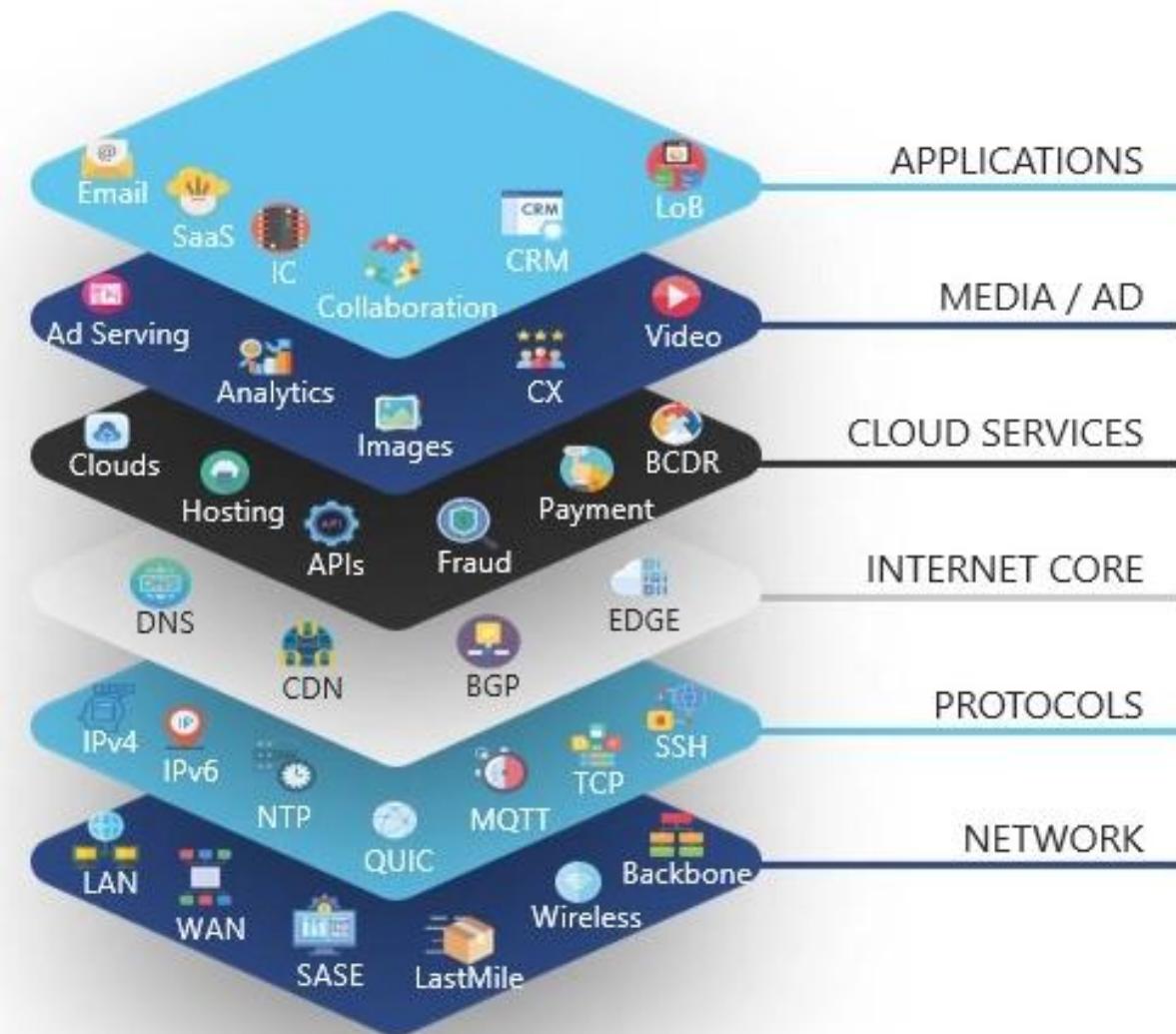
[Streaming](#)



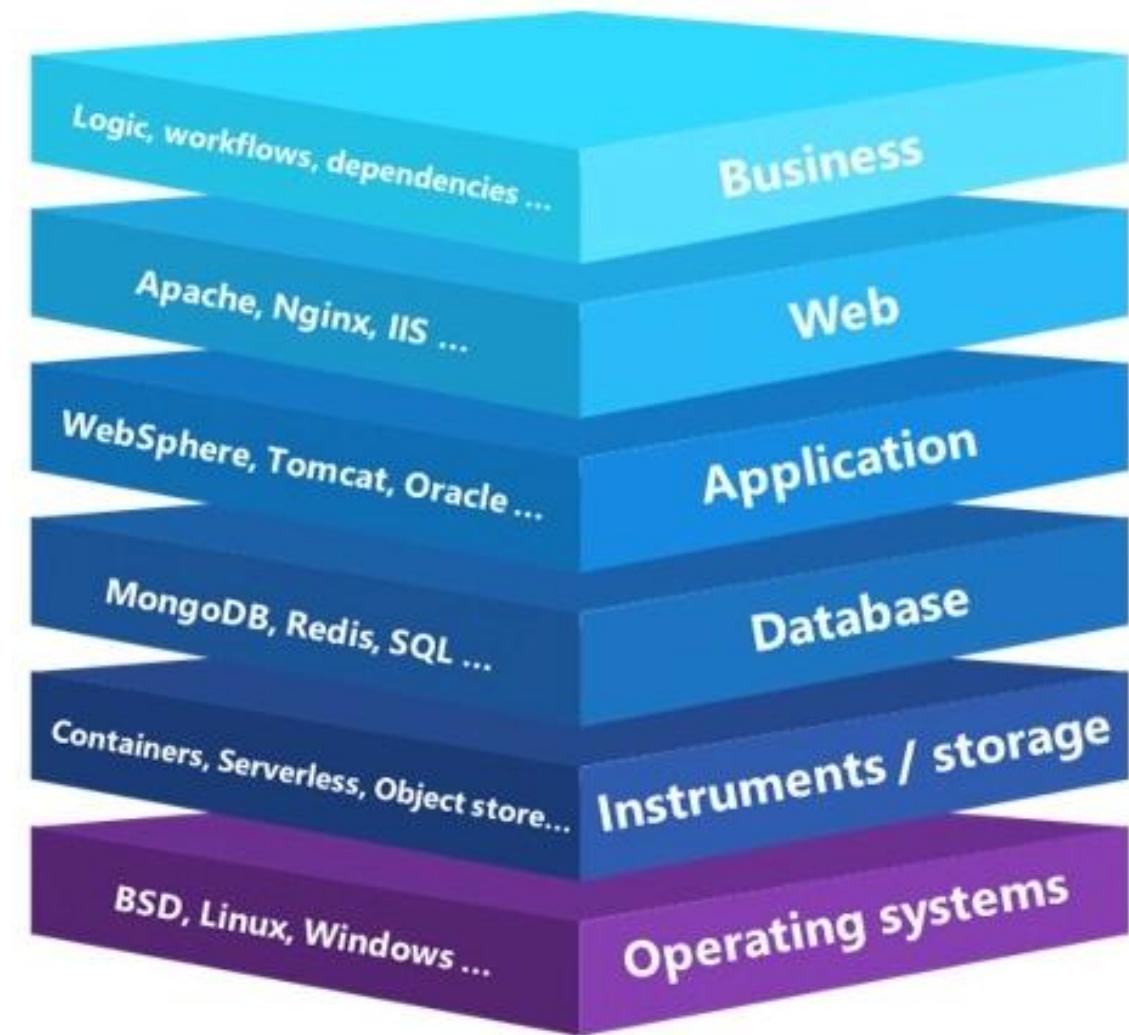


Your Application Infrastructure
is the internet!

IPM for Internet Stack



APM for Application Stack



THREE PILLARS OF NETWORK MONITORING

NETWORK TRAFFIC ANALYTICS



Network Flow

SYNTHETIC TESTING

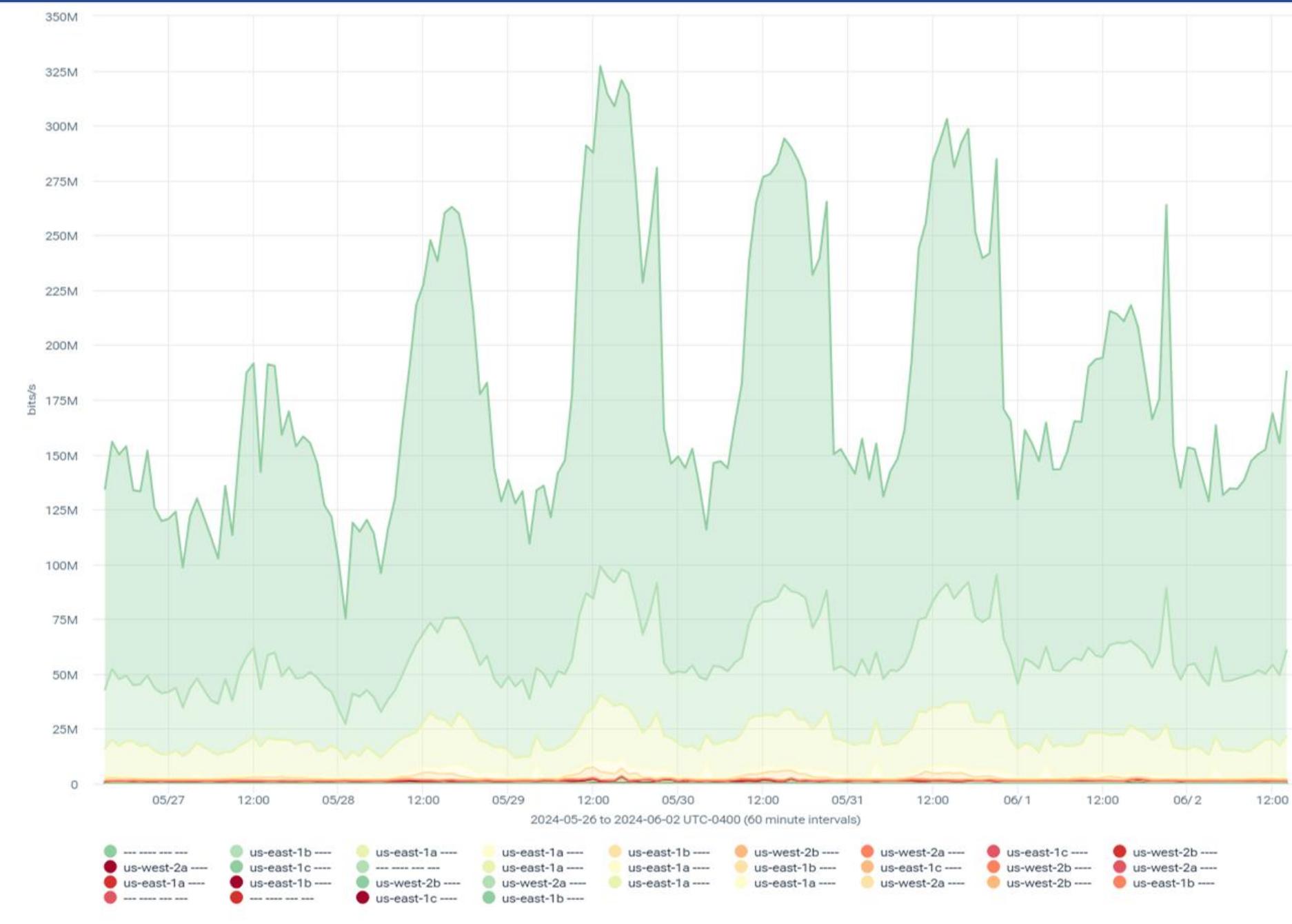


Digital Experience Monitoring

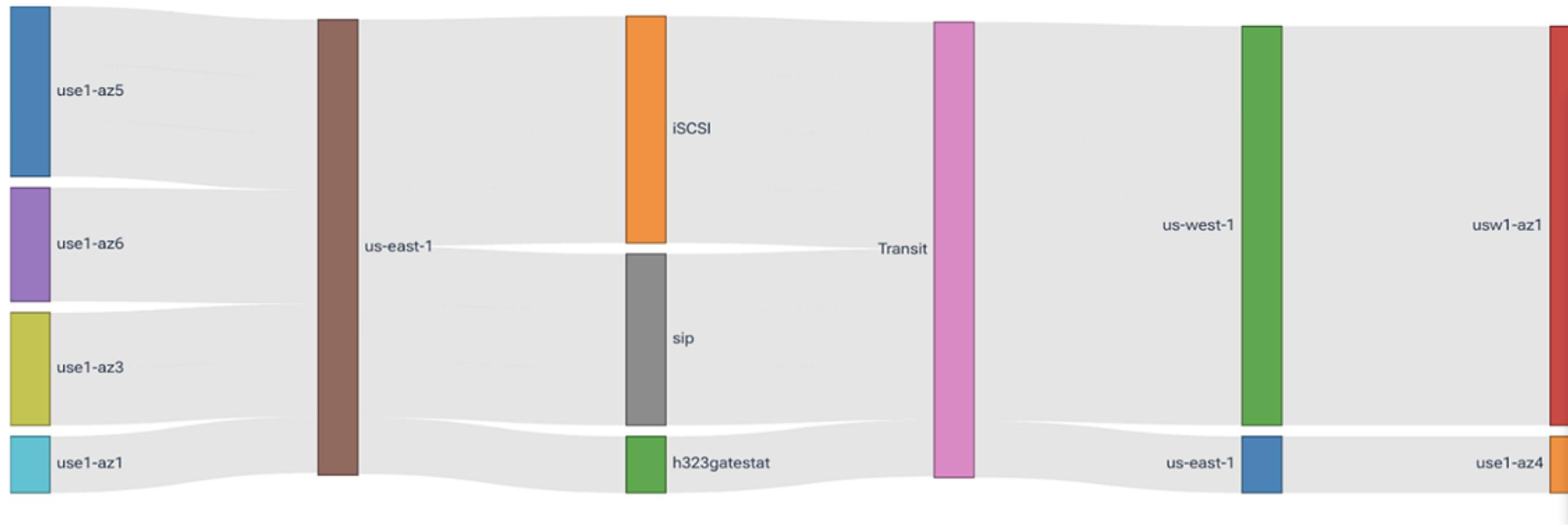
INFRASTRUCTURE METRICS



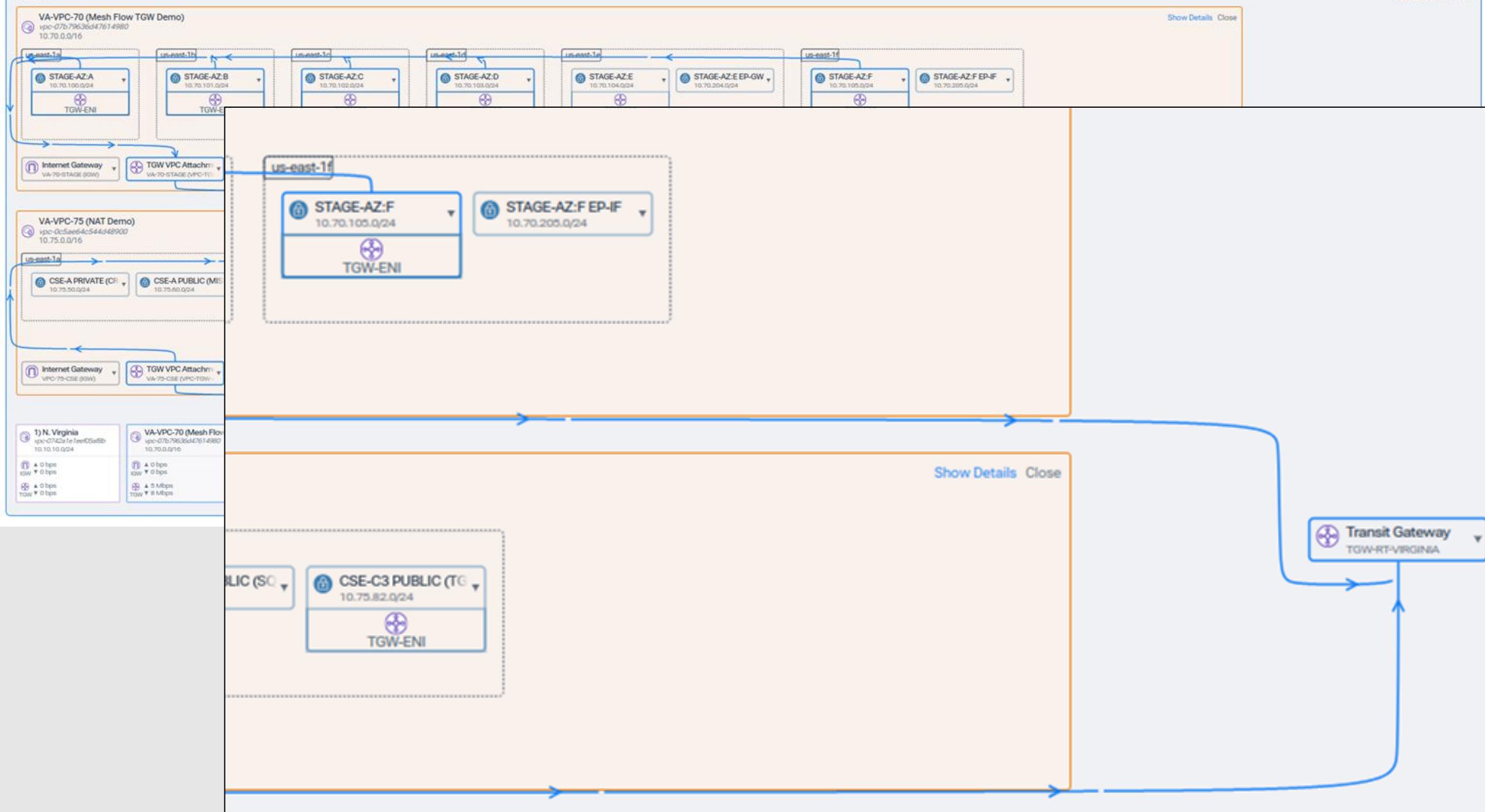
Network Monitoring Systems







us-east-1



- By source / destination
- By port
- By protocol
- By application
- By geography (based on IP)

Flow Telemetry Options

I want to hear from you!

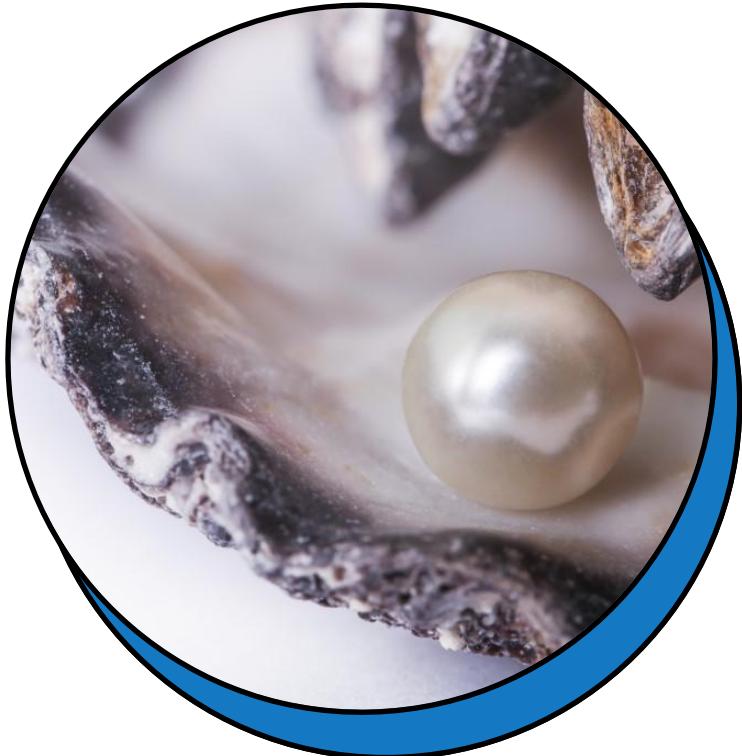


@LeonAdato
or
leon@catchpoint.com

bit.ly/APIWorld25



Are you ~~irritated~~ ?



I'm ready
for your questions!

bit.ly/APIWorld25

