

Google Cloud

# Next '23

Three ways to enhance  
end-user experience  
across hybrid and  
multicloud environments





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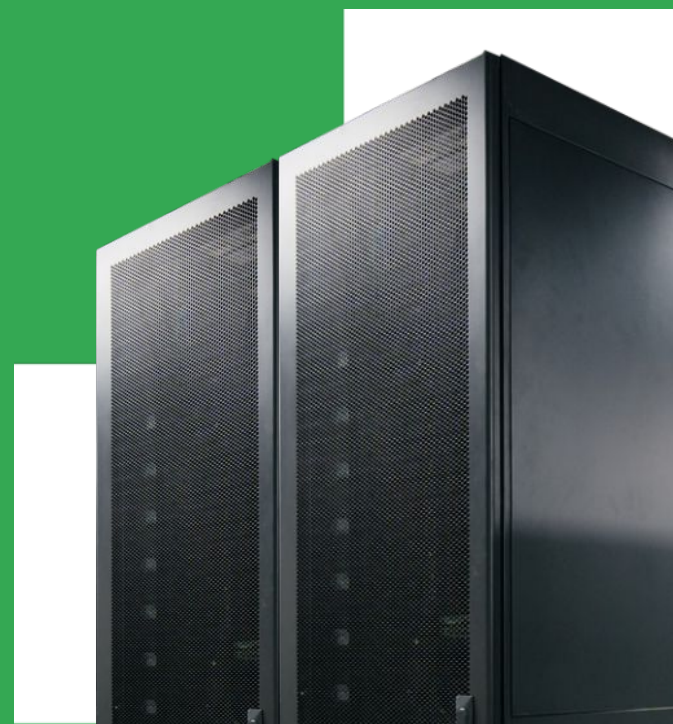
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# Current State

## Networking



# Cloud-first

“By 2024, nearly 60% of IT spending on application software will be directed toward cloud technologies.”

- **Gartner**

*How Cloud Adoption Will Increase Opex Budgets*  
Published 20 May 2022 - ID G00765092

## The Common Element

The **network** is the one thing that connects all of your users, apps, locations, and infrastructure and you have the least control over it.

- Run your own app in the cloud
- Use Gmail, Google Meet, and other cloud apps
- Running COTS in the cloud

# The User Experience Problem

User Experience metrics are not in the cloud dataset because they must come from the end-user perspective.

## End-to-end Visibility

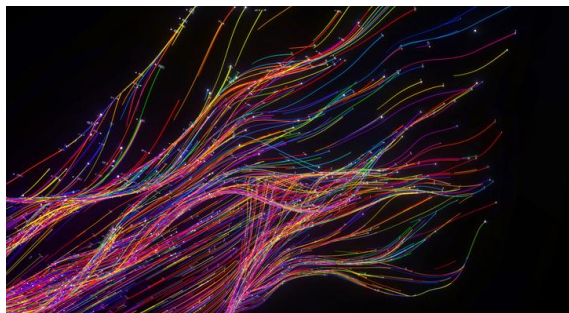
Performance depends on the entire delivery chain between app and user which involves both internally managed (IT-owned) and 3rd-party managed (eg, ISP) networks.

A device-centric approach must be replaced with a user-centric one in order to measure the performance of cloud apps.

- Network vs. Application Metrics
- Isolating Error Domains
- Owned vs. Unowned Infrastructure
- Responsibility for Performance

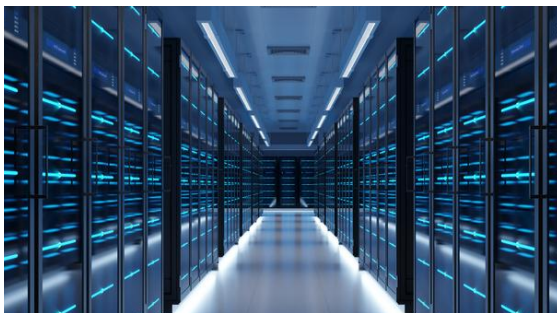


# Modern Networks



## Dynamic

Networks are changing every minute to follow variable routing rules in software-defined cloud and ISP environments.



## Complex

Applications rely on thousands of interconnected devices and networks across multiple companies making validation necessary.



## Out of your control

The IT-owned portion of network infrastructure is rapidly decreasing as companies adopt new internet-first methodologies.

# Pharmaceutical Manufacturing



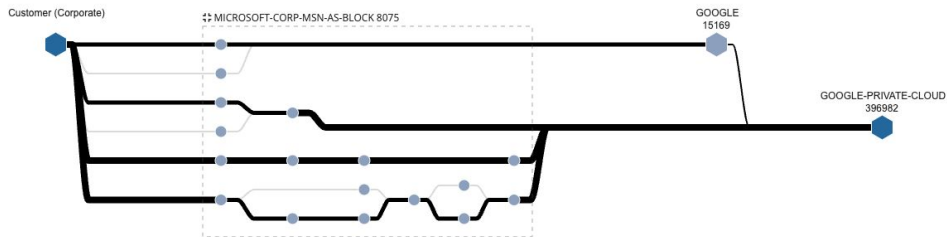
## Challenge

Customer expanded from a single cloud to a multi-cloud environment, the need to modernize their performance visibility across clouds to ensure end-user experience and application performance.



## Solution

The AppNeta solution provides comprehensive performance visibility over the internet as they expanded from one to four cloud providers, offices and integrated SaaS services to meet all of their business needs.



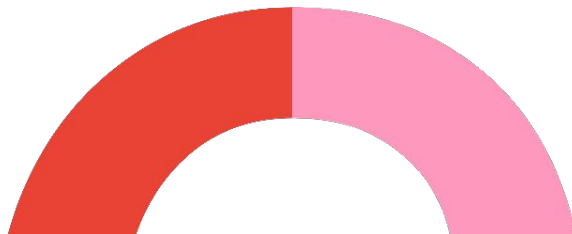
## Result

Actively monitoring from data centers and offices, as well as remote users through SASE services ensured the performance required was delivered for optimal end-user experience and application performance.



## Who is accountable?

Visibility into the end-to-end delivery of business-critical apps to users is everyone's responsibility

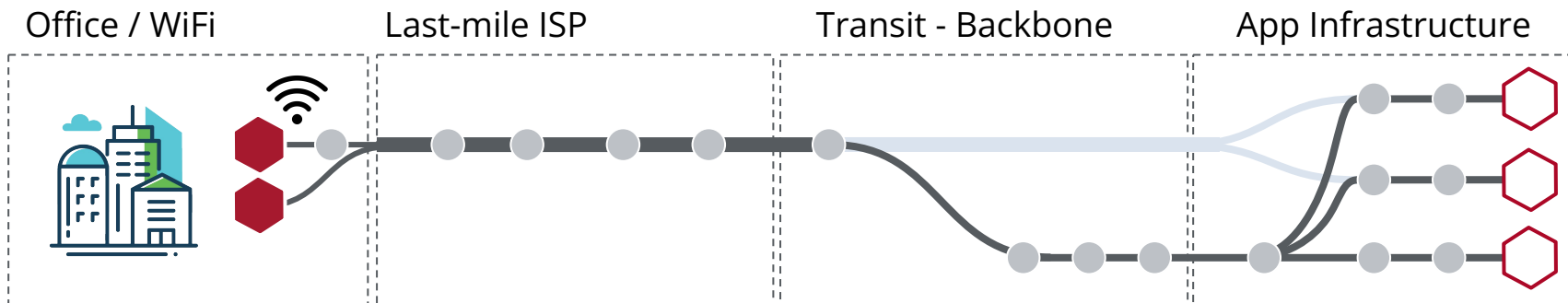


# 3 ways

to enhance user and app experience

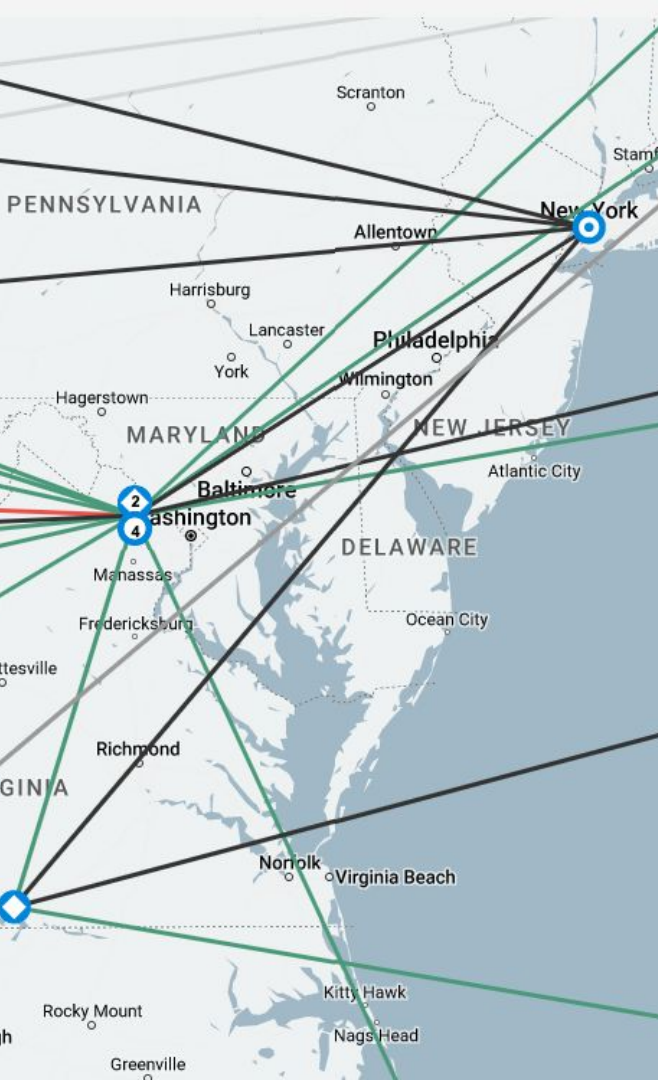
- Embrace the reality of dynamic networks
- Work from an actionable dataset
- Monitor from multiple perspectives

# End-to-end Network



## AppNeta provides visibility into:

1. Office environment (Wireless vs. wired? AP-specific issues)
2. User's Last-mile ISP (or enterprise ISP in that case)
3. Whatever the mid-path is (ie. Comcast peers with Level 3 -- is it there?)
4. The cloud-based environment or the enterprise infrastructure



# Dynamic Networks

1

## Hybrid and remote work

Users are also changing locations more than ever with WFH and hybrid workers that IT must keep track of to isolate when last-mile connectivity, VPNs, or Wi-Fi is to blame for poor performance.

2

## Multi-path internet

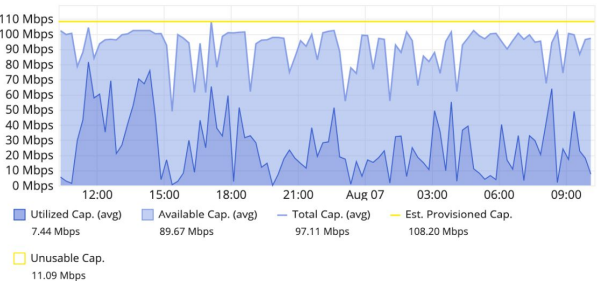
BGP pathing and load balancing within ISPs keeps networks up, but with network paths that change every minute we need a new approach.

3

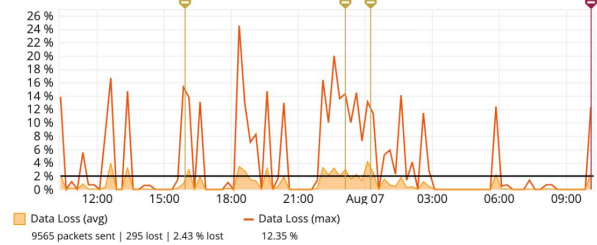
## Software defined

Custom routing software inside of cloud providers adds to the issue of understanding the active network path for users.

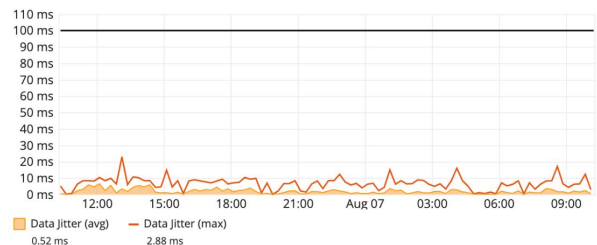
Aug 07, 2023 10:00:00 - 10:15:00 EDT



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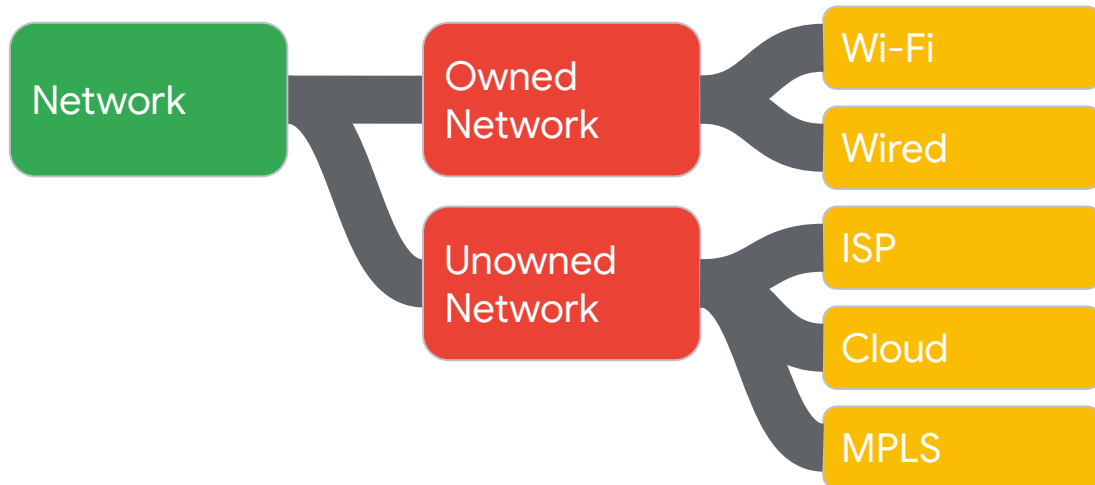


# Actionable Data



What data is important?

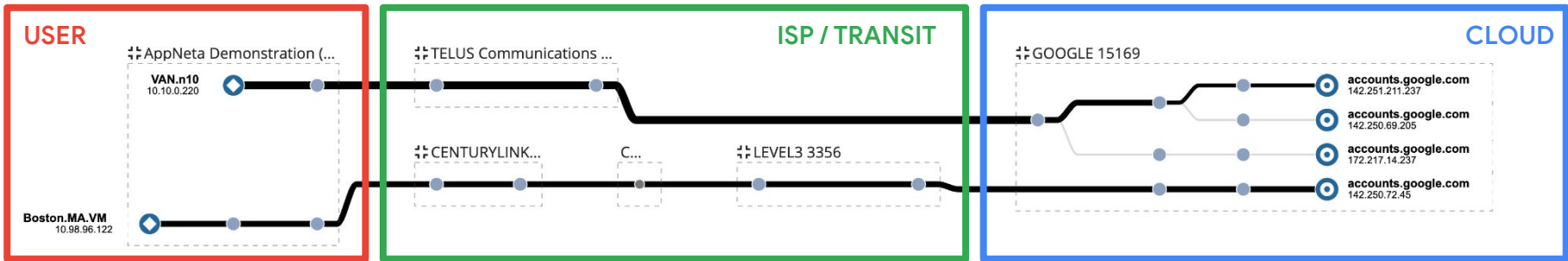
Loss, Latency, and Jitter are a good start, but understanding the end-to-end capacity and how apps are impacting connections is key.



# Actionable Data

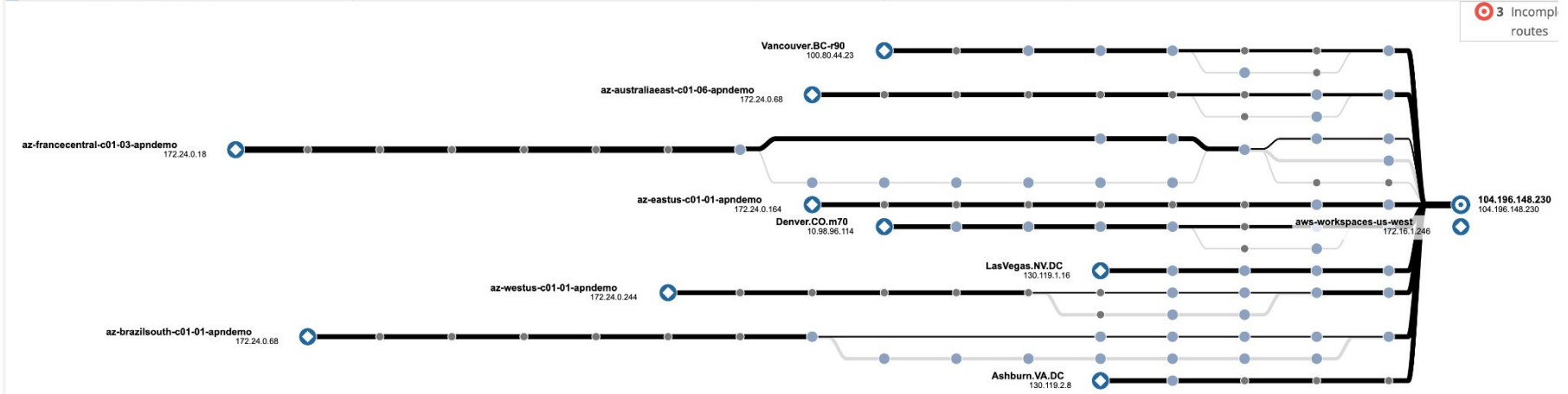
Hop **63-225-124-73.hlrn.qwest.net**  
 63.225.124.73 **63.225.124.0/22**

Network **CENTURYLINK-US-LEGACY-QWEST 209** Traceroutes **ICMP 3 42.86%**  RTT **10.46 ms**

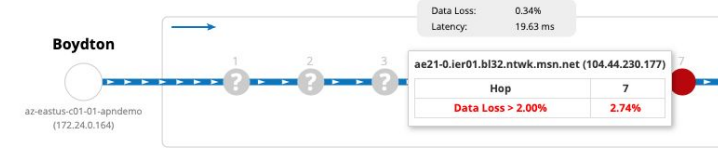


Hop **ae100-0.icr01.fra23.ntwk.msn.net**  
 104.44.20.187 **104.40.0.0/13**

Network **MICROSOFT-CORP-MSN-AS-BLOCK 8075** Traceroutes **UDP 4 12.90%**  Avg. RTT **24.92 ms**



Monitor suspects data loss violated - Completed at 08/11/2023 11:56



	Hop	Severity	IP Address	Host Name	Data Loss (%)	Measured MTU (bytes)	Latency (ms)	Data J Avg
	7	<span style="color: red;">✖</span>	104.44.230.177	ae21-0.ier01.bl3...	2.74	1500	0.57	-
<b>Certainty</b>		<b>Diagnostic</b>						
<span style="color: orange;">!</span> 31%		<ul style="list-style-type: none"> <li>Rate-limiting behavior detected</li> </ul>						
<b>Frequency</b>		<b>Observation</b>						
<span style="color: orange;">!</span> 39%		<ul style="list-style-type: none"> <li>Packet reordering detected                             <ul style="list-style-type: none"> <li>Excessive levels may cause performance degradation in some applications</li> </ul> </li> </ul>						
<span style="color: orange;">!</span> -		<ul style="list-style-type: none"> <li>Insufficient statistics to generate all measurements                             <ul style="list-style-type: none"> <li>Packet loss may be interfering with test results</li> </ul> </li> </ul>						
<span style="color: red;">✖</span> 3%		<ul style="list-style-type: none"> <li>Packet loss detected                             <ul style="list-style-type: none"> <li>Exceeds reasonable tolerances for this network path</li> </ul> </li> </ul>						
	8	<span style="color: green;">✔</span>	104.44.56.160	104.44.56.160	0.00	1500	0.78	0.95
	9	<span style="color: blue;">i</span>	104.196.148.230	104.196.148.230	0.34	1500	19.63	3.44

# Actionable Data



What data is important?

Loss, Latency, and Jitter are a good start, but understanding the end-to-end capacity and how apps are impacting connections is key.



Reduce the scope

Knowing where a network issue is occurring provides the most actionable way to understand who is responsible for fixing the problem.

## Violation Duration (avg/monitored path)

**16h 0m 0s**  
9 paths 2 groups

**14h 7m 22s**  
21 paths 2 groups

**8h 37m**  
102 paths

Microsoft Corporation  
**16h 0m 0s**

TELUS  
**14h 7m 22s**

Zayo  
**8h 37m**

Verso Networks  
**15h 41m 35s**

Consolidated Communications  
**10h 31m 23s**

Microsoft Azure  
**7h 35m 55s**

# Actionable Data



**What data is important?**

Loss, Latency, and Jitter are a good start, but understanding the end-to-end capacity and how apps are impacting connections is key.



**Reduce the scope**

Knowing where a network issue is occurring provides the most actionable way to understand who is responsible for fixing the problem.



**Proactive over reactive**

Detecting and diagnosing issues before they impact users with continuous monitoring and proactive alerting will lead to far better results than just identifying that it's not your fault.



# Major Software Vendor



## Challenge

- 100+ Offices
- 1000+ Remote Users
- Multiple Cloud Regions



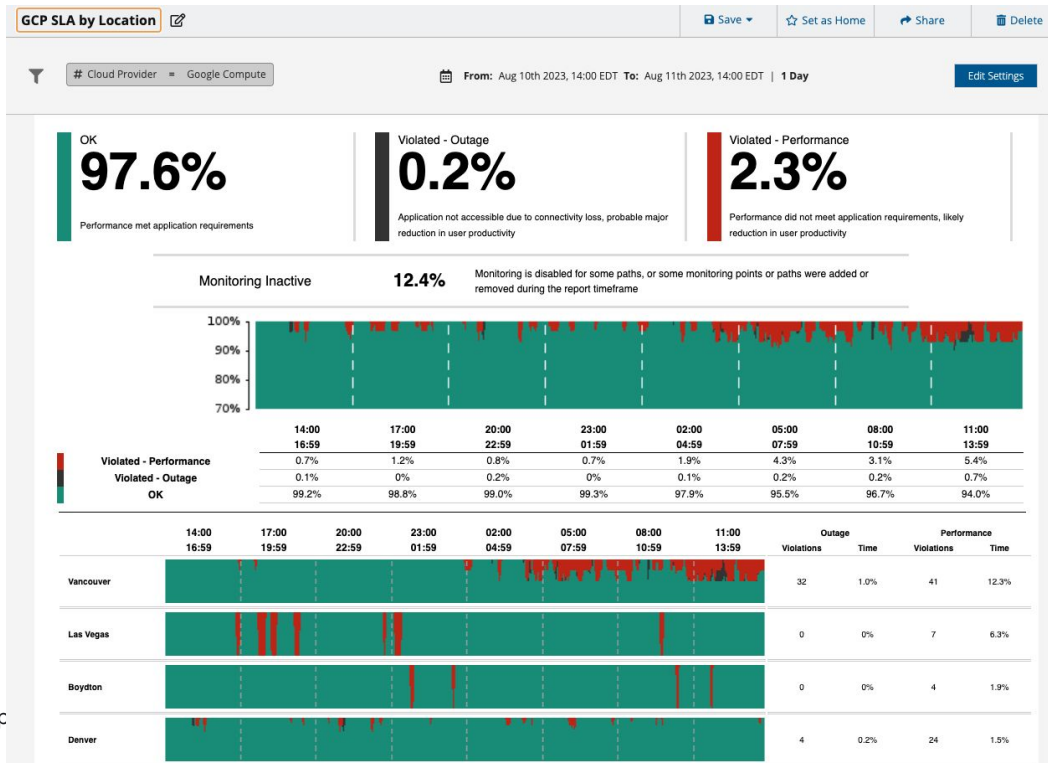
## Solution

- Full end-to-end mesh between all critical sites
- North-south visibility for site-to-cloud



## Result

- Proactively ensure end-user experience and employee productivity





# Multi-dimensional Validation

1

## Application complexity

From single page apps to CDN replication, apps are more difficult to monitor when you don't own the underlying infrastructure.

2

## Active and continuous

Monitoring 24/7 with low overhead means you can understand when changes are affecting performance before it impacts users.

3

## Long-term network health

Long-term planning is crucial and knowing when the network is supporting your business objectives and when it's hampering them is key.



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&



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