Miercom

2020

Cisco Umbrella

Summary Report SR291118E
Performance Validation Testing

CONTENTS

KEY FINDINGS

1

Cisco asked Miercom in October 2020 to conduct a performance evaluation of Cisco Umbrella, a cloud-native security service and core of Cisco's SASE architecture. Using tests designed to validate Cisco's commitment to providing faster access and speed while accessing the internet and cloud applications, we found the Cisco Umbrella cloud security service achieved the following outcomes:

- Reduced hop count by up to 33%, offering improved platform experience
- Latency and traffic consistency (jitter) improved by up to 73%
- Substantive network performance improvements, measured using real application use case
- Better overall end user quality of experience

Our test focus was on Cisco Umbrella's performance and its innovative use of Anycast to improve this performance, as well as reliability. Anycast allows Umbrella infrastructure to execute functionality (e.g. updates, additions, removals) without sacrificing data center uptime or user experience. Should an unplanned interruption occur – a rare but possible occurrence in any cloud service, Umbrella's Anycast deployment performs automatic data failover. This serves as just one example of the Umbrella infrastructure's self-healing, highly automated and agile capabilities.

Based on our findings, Cisco Umbrella displayed impressive end user experience – proving high performance functionality with reduced latency and hop count, as well as effective network security. We proudly recommend the Cisco Umbrella Cloud Security Service as a secure, efficient access to enhancing cloud application servicing and award Cisco the *Miercom Performance Verified* certification.

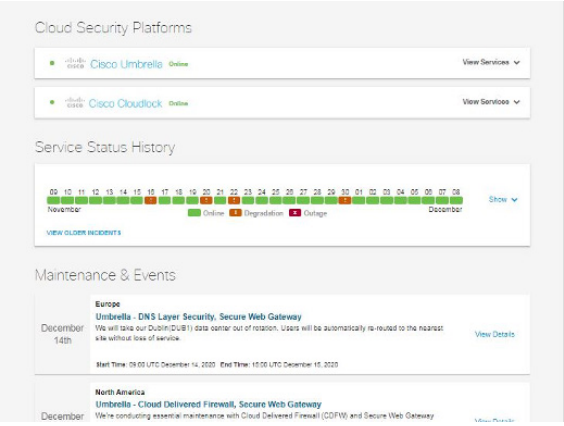
Rob Smithers

CEO, Miercom

2 Introduction

As security moves from the data center to the edge – to support direct internet access, cloud application usage, and an increasingly remote and roaming workforce – traditional data center oriented security solutions fall short in security and performance. Since the data center is no longer the hub, more focus must be placed on end users which each must be treated like a "branch office of one." Regardless of where users work, a seamless, secure, and consistent connection to applications, with lowest latency, is essential.

Virtually all IT, security, and networking analysts speak to the shift in market and architecture that this brings. Gartner coined the term SASE to describe a new type of architecture that combines a wide range of security and edge networking capabilities into one unified solution, commenting that when selecting a cloud security service, it is important to consider network performance. Users' devices create multiple simultaneous connections each time they access a website. Other vendors might advertise a large number of Points of Presence (POPs) for their service, but many of these may be limited to individual customers or service providers. And while establishing a fast connection is important, it is critical to do so without delay. One of the easiest ways to do this is to bring the users closer to the services they are consuming, thus increasing performance. This can be accomplished by reduced hop count, multiple world-wide peering points, or a large back bone; it all translates to reduced latency.



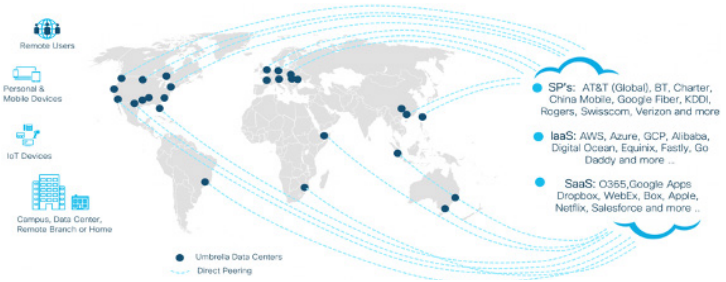
Miercom's services provide many Fortune 500 businesses that deploy cloud security and SaaS solutions, like Cisco Umbrella, a way to measure security efficacy and performance achievements. Based on test results, we observed Cisco Umbrella provides substantially beneficial security efficacy and performance improvement for its customers. The combination of its rich, effective and seamless security features yielded observable and noticeable improvement in application response. This allows Cisco to be a clear choice in a cloud services solution for overall improved end user quality of experience. Measurable test results showed lower latency, reduced hop counts, and reduced TCP retransmissions when Cisco Umbrella was employed during simultaneous execution of multiple cloud applications. "Things really working better, appearing less congested" was noted by Miercom during a peak time of day and local usage for cloud applications.

Organizations reap the benefits of Umbrella being truly cloud-native – providing high capacity and throughput, solid reliability, and agile infrastructure. Its ability to dynamically scale, protect access bandwidth, and reduced unneeded delay without costly and slow deployment of on-premise equipment upgrades, make Cisco Umbrella an excellent investment and protection package. Such flexible, effective protection would not be possible if not for Cisco Umbrella's ground-up, cloud-centric design. We found Cisco Umbrella to be very transparent, honest and accurate by producing network uptime status, externally publishing via an Enterprise Status portal (reachable either over https://status.umbrella.com or directly, using https://146.112.59.2). The uptime record is reported to be 99.999 percent availability for Cisco Umbrella service.

About Cisco Umbrella

3

Cisco Umbrella, a cloud-native security service, simplifies network security by helping organizations secure internet access and control cloud app usage across the network, branch offices, and roaming users. Umbrella unifies DNS-layer protection, secure web gateway, firewall, and cloud access security broker (CASB) functionality, to easily help protect remote and roaming users, secure SD-WAN, and embrace direct internet access.



Cloud Security Infrastructure of Cisco Umbrella

Umbrella's highly resilient cloud infrastructure boasts 100 percent business uptime since 2006. Using Anycast routing, any of its 32+ customer-facing data centers across the globe are available using the same single IP address. As a result, user requests are transparently sent to the nearest, fastest data center and failover is automatic.

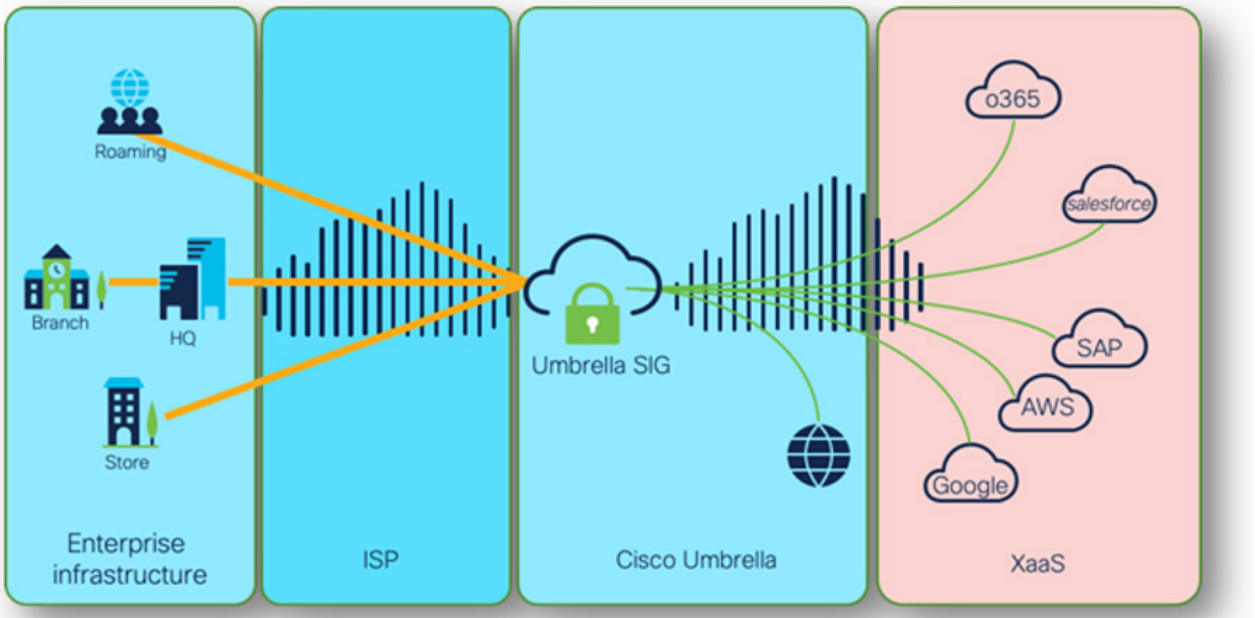
To reduce latency, Umbrella peers with over 1000 of the world's top internet service providers (ISPs), content delivery networks (CDNs) and SaaS platforms to deliver the fastest route for any request — resulting in superior speed, effective security and the best user satisfaction. With direct peering, customers gain a secure, high performance and low latency path to their applications.

Cisco Umbrella leverages Anycast technology for more than DNS – it simplifies deployment of all Umbrella capabilities by providing automatic backup tunnel redundancy. This automated tunnel creation eliminates manual intervention for tunnel and POP switching and increased reliability when integrated with Cisco SD-WAN (Viptela). Umbrella can then easily execute functions without incurring downtime or affecting user quality of experience.

4 Performance Test Approach

Miercom engineers participated in live performance testing from several locations. Tests were conducted from New York, NY, San Jose, CA, Ashburn, VA, and Frankfurt, Germany using Thousand Eyes probes. Thousand Eyes probes provided Miercom with personalized monitoring capabilities and enabled them to correlate multiple telemetry sources and abstract this information to prove the performance of the Cisco Umbrella network.

Test Topology



Source: Cisco

We employed a typical enterprise network connectivity pattern above. Each workstation was directly connected to the internet first without Umbrella, then with Umbrella with no policies set, and then with Umbrella with all security features and full inspection enabled. Within each application, we tested the performance associated with file downloads, page loads, and latency – for 10 minutes.

Test Tools

ThousandEyes combines several vantage points to monitor a network environment. The Cloud and Enterprise Agents were used to test Umbrella services, monitor on-premise hardware, as well as internal and external BGP paths. The Endpoint Agents run on end-user workstations, measuring the digital experience when using business-critical applications (regardless of location). Internet Insights was used to correlate global, Internet-wide outages of critical services, with telemetry received from the Cloud, Enterprise and Endpoint Agents.

Test Methodology

We employed a series of test scenarios and locations to demonstrate the benefits of the Umbrella service. Connectivity to the data center locations included: New York, NY, San Jose, CA, Ashburn, VA, and Frankfurt, Germany. Before testing, we ensured the installation of the Umbrella certificate, Chrome browser on-site, and Easy Auto Refresh. IPsec encryption tunneling was used. Tests were performed through ISR routers and Meraki MX devices.

Without logging into the service, the page was set to refresh every 20 seconds – using the Easy Auto Refresh extension. Each test was run for 10 minutes, with cache disabled.

Three scenarios were used:

1. Test direct to Internet
2. Test using Umbrella, with no policies set; and
3. Test with cloud-delivered firewall and secure web gateway (full proxy) policies active

Tested Applications:

Salesforce

AWS

Zendesk

Box

Dropbox

Office 365

Google Apps

Results

5

Internet Connection Only (No Umbrella Service)

The performance evaluation started with testing connectivity from the city (repeated for each city) without the Umbrella solution deployed. Applications were automatically refreshed every 20 seconds, with caches disabled for each service. Using regular internet service, we observed typical web traffic for applications (e.g. Amazon, Dropbox, Office 365) and noted how long it took each page to load. For example, Google Docs took 20 seconds to load. Using the ThousandEyes tool, we were able to see errors when pages were unable to load, record the hop count, and measure the latency and deviation in latency.

Umbrella (No Security Policies)

Once switching to the Umbrella Service, we saw a reduced hop count for application service use – even without policies applied. Using a 10-minute sample observation window, we exported a data set to the ThousandEyes analysis tool. We looked at two aspects: first-page fetch and patch trace. We observed a better connection experience with the Umbrella service enabled, with quicker page fetch response and smaller hop counts, reduced and more consistent latency.

Umbrella with Cloud-delivered Firewall & Secure Web Gateway (full proxy) Policies

In the Cisco Umbrella dashboard, we changed the policy to cloud-delivered firewall and secure web gateway. Using an active tunnel to the data center from each city, the policies were applied. As expected, service was degraded compared to the clean connection through Umbrella due to the applied security policies that also included HTTPS inspection.

Data Center Location	Hop Count		Hop Count Improvement (%)	Latency (ms)		Reduction in Latency (%)
	Before	After		Before	After	
New York, NY	15	12	20.0	60	21	65.0
San Jose, CA	14	11	21.4	58	14	67.6
Ashburn, VA	16	13	18.8	62	22	64.5
Frankfurt, Germany	18	12	33.3	67	18	73.1

Cisco Umbrella with cloud delivered firewall and secure web gateway demonstrated exceptional performance and end user quality of experience by providing improved network connectivity using the Cisco private network access to SaaS based applications. Data above reflects access to Box content management application. Test results show before and after Cisco Umbrella was enabled and measured the average of ICMP and traceroute response for four locations during normal business hours of activity accessing the application.

The Cisco Advantage. This seamlessly integrated cloud-native solution affords organizations a high-end performance with optimized routing, reduced latency and a noticeable boost in quality of experience.

About Miercom Performance Verified

This report was sponsored by Cisco Systems, Inc. The data was obtained completely and independently by Miercom engineers and lab-test staff as part of our Performance Verified assessment. Testing such as this is based on a methodology that is jointly co-developed with the sponsoring vendor. The test cases are designed to focus on specific claims of the sponsoring vendor, and either validate or repudiate those claims. The results are presented in a report such as this one, independently published by Miercom.

About Miercom

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