ThousandEyes - The Future of Network Monitoring

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INTRODUCTION

GlobeNewswire reported in August 2020 that the global cloud computing market size is expected to grow from USD 371.4 billion in 2020 to USD 832.1 billion by 2025, at an annual compound growth rate (CAGR) of 17.5% during the forecast period.[1] That growth can be attributed to a number of factors related to cloud computing including the rise of hyperscale cloud providers (AWS, Google Cloud, Microsoft Azure), the work-remote movement brought on by the coronavirus pandemic, the demand from enterprises around the world for more dynamic and scalable computing resources, and the emergence of software-as-a-service (SaaS) software companies to name a few. With this ever-changing computing environment there is a simultaneous change in the networking and security architectures implemented to safely operate in a multi-cloud, multi-provider world. Under this new paradigm, organizations must adopt new and innovative management tools to gain visibility and control outside of traditional self-owned data centers and into the internet transport and cloud providers themselves.

Today's enterprises are typically already in transformational motions and find themselves relying on extremely complex inter-dependent services across cloud, SaaS and internet providers. Today cloud is the new datacenter, internet is the new network, & SaaS is the new application stack. The internet however was never intended to be an enterprise-grade network for businesses to just plug into and operate. Outages happen all the time in this new paradigm and often are beyond our visibility and certainly beyond our historical control mechanisms. The internet is ungoverned and traditional Information Technology (IT) tools tend to flatline in the cloud. Between January 2020 and August 2021, as enterprises made the shift to sustained remote work, 95% of outages occurred within Internet and transit providers.[2] Traditional IT tools have limited if any visibility into the ISP's networks, or the internet path between service locations.

Where does this leave an IT team when it comes to managing environmental components and maintaining internal and customer-facing service-level requirements?

Enterprise customers utilizing services such as AWS, Office 365, GovCloud, Microsoft Teams, and Cisco WebEx need more visibility across the internet itself and into the cloud provider resources to manage performance and uptime. The new problem organizations are trying to solve is how can we now provide this visibility into the uncontrolled and open cloud and internet environment without breaking the bank or creating unnecessary and additional operational resources for organizations to manage.

(1) https://www.globenewswire.com/news-release/2020/08/21/2081841/0/en/Cloud-Computing-Industry-to-Grow-from-371-4-Billion-in-2020-to-832-1-Billion-by-2025-at-a-CAGR-of-17-5.html#
(2) https://www.thousandeyes.com/blog/extending-webex-visibility-hybrid-work-experience

Figure 1 – Sample of Major Cloud and SaaS Providers

Enterprise customers have come to expect a great user experience and frankly demand it to execute on their missions. In traditional (pre-cloud) enterprise networks, all service stacks were hosted in the datacenter. Furthermore, campuses were traditionally connected via multiprotocol label switching (MPLS) or similar private fixed circuits. This architecture allowed employees and customers to reach back for resources only as far as their own datacenters for their services, including VoIP, Instant Messaging, Email, customer applications, file storage, and other critical business applications. Datacenters themselves were usually hosted on-premises, or in headquarter buildings with purpose-built infrastructure hosting rooms. Even when organizations started getting themselves out of the space/power/cooling business, physical hosting of infrastructure was moved from premise buildings to local (same city) hosting facilities with short-hop private network connections.

The image anymore of this topology brings a smile to my face as it reads like the 'good old days' given the enormous rise of public and hybrid cloud designs most organizations are now operating. Figure 2 gives a simple illustration of what this design generally looked like. One inherent positive of 'pre-cloud' enterprise network architecture was more straightforward visibility and control over issues impacting customer experience. However, since within these designs traffic was backhauled to the datacenter for services, these architectures were and still are saddled with high network transport costs. SD-WAN is starting to be more widely adopted as the fix to high-cost private networks, but it is a new method of delivering network services over the internet and contributor to the increased need for more comprehensive visibility.

Figure 2 – Sample Diagram of legacy campus plus remote network design
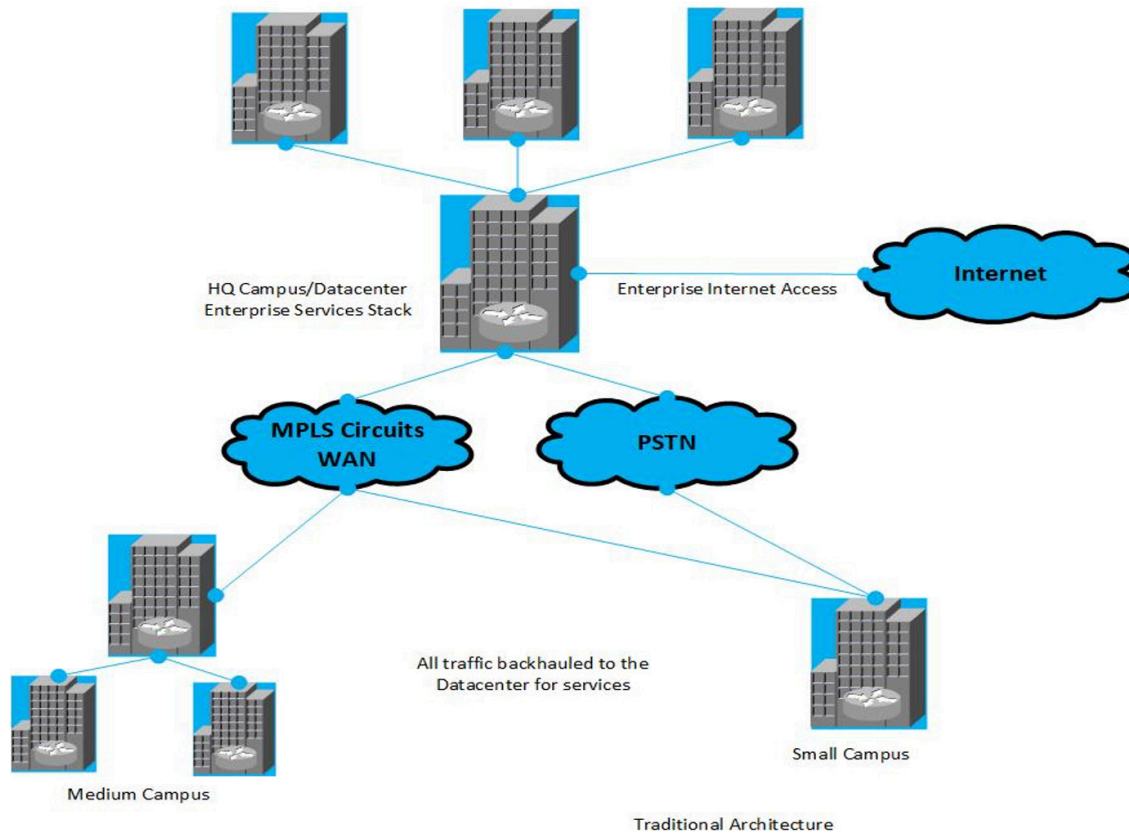
With traditional architecture an enterprise networking team could easily get engaged and provide timely resolution to performance issues. Having some degree of ownership over the circuits also helped optimize the user experience with added stability across network operations, largely due to more comprehensive control. In today's enterprise the shift to cloud and SaaS based solutions has forever combined private and public network topology design, and the way we approach network issues causing service impacts on our employees. With increases in Mean Time to Troubleshoot (MTTT) and Mean Time to Respond (MTTR) on outages in this new operating environment, administrators are constantly looking for more visibility into network issues that arise across the internet or public component of the design. This thirst for greater visibility is to regain some control of the new network so that high standards of service can continue for users utilizing any environment.

SOLUTION

In August of 2020 Cisco announced it had completed the acquisition of ThousandEyes. At its core business value proposition, ThousandEyes helps organizations navigate the digital transformation journey by providing end-to-end insight and intelligence into 3rd party dependencies, monitoring the health of Internet Service Provider's (ISP's) connectivity for applications and services. Monitoring the path of utilization and the health of the internet is accomplished by utilizing three distinct vantage points also known as agents or vantage points: Enterprise Agents, End-user Agents, and Cloud Agents.

Enterprise Vantage Points/Agents – Enterprise agents provide visibility within datacenters, branch offices, and across cloud environments. They provide active monitoring via Simple Network Management Protocol (SNMP) monitoring, discovery, and mapping of topology of internal network devices. Enterprise agents can be installed on devices by Cisco, Juniper, Microsoft, Linux, VMware, Docker, and more.

Enterprise agents allow for visibility into device health through polling, application performance through measurement of metrics like page load times, and network path and performance using ThousandEyes Path Visualization. These lightweight agents help execute traffic diagnostics from Layer 7 down to Layer 2. One of the best attributes of these agents is the fact they can be deployed on such a wide variety of devices, including laptops, servers, virtual machines, routers, and micro-appliances. Through integrations resulting from Cisco's acquisition, Enterprise Agents run natively on Cisco Catalyst 9300 and 9400 Series Switches as well as certain SD-WAN routing platforms, extending the capabilities of investments likely already in place for organizations around these popular solutions.

End User Vantage Points /Agents – The End User Agents give network operations personnel the ability to analyze and triage issues down to the individual end user device level. These agents offer end user experience monitoring on both mac and windows devices. End User Vantage Points utilize http and network monitoring tests with insights all the way into routing paths. Real- time monitoring is available and can be enabled via a browser-based plugin. This type of service is especially relevant to properly support today's remote workforce movement, having the ability to analyze browser sessions and proactively understand the Wi-Fi and access points that a user may be connected to. Like the Enterprise Agents, the End User Agent is lightweight and typically uses less than 1% CPU and less than 50MB of memory on a laptop, making it less burdensome than most agent-based client monitoring tools.

Cloud Vantage Points/Agents – ThousandEyes Cloud Agents are located in over 200 cities in 62 countries[3], hosted in Internet Service Providers (ISP's), broadband services providers, and regional datacenters for major cloud providers. Cloud Agents are maintained by ThousandEyes and provide similar functionality as Enterprise Agents. Cloud agents are strategically placed in Tier 1, Tier 2, & Tier 3 service providers, providing globally distributed Vantage Points into external and internally hosted applications.

With Cloud Agents deployed throughout the world, coupled with End User and Enterprise Vantage Points deployed throughout the enterprise workspace, the ability to identify issues in the service path as they arise can now provide the control modern IT teams have been seeking. ThousandEyes' visibility into the internet will literally open the eyes of network teams into all issues impacting their customer's user experience. Utilizing these agents provides the visibility that allows for swift issue identification and where the issues are located. With this information IT operators can reach out to the appropriate service providers who own the issues and advise them of the outage or issues impacting service.

(3) https://www.thousandeyes.com/product/cloud-agents

This level of information can greatly reduce the MTTT & MTTR for all involved parties. In an analysis of themselves, Cisco's own Andrea Di Lecce shared that Cisco was able to reduce MTTT by 43% and MTTR by 8% by using ThousandEyes. [4]

So how does it work? Data is collected by the agents throughout the network and internet, and is directed to a ThousandEyes intelligence engine. This engine generates dashboards and reports such as the path visualization, shown in figure 3 below. The network path visualization automatically generates unified, interactive, multipoint, and topologically correlated views of all network paths between selected agents and the target URL or IP. Utilizing the dashboard and reports allows administrators new visibility that can change the way they operate and troubleshoot outages impacting their customers and users.

Figure 3 – ThousandEyes Network Path Visualization Dashboard
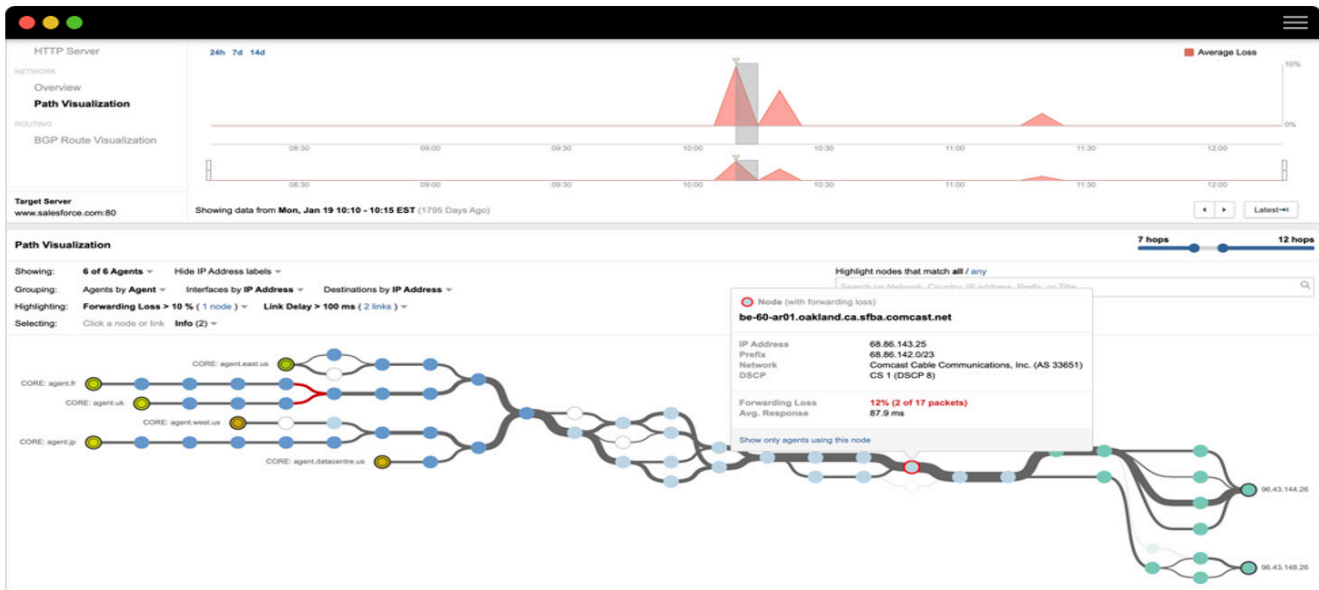
Once Vantage Points/Agents are deployed, Enterprise & Endpoint Agents can be used to test and report detailed information about outages, and issues that may impact the customer experience. Enterprise and Endpoint Agents send User Datagram Protocol (UDP), Transmission Control Protocol (TCP), & Internet Control Message Protocol (ICMP) packets out across the internet to measure the performance of the interfaces and connections across the path.

By utilizing Vantage Points' additional features called Network and Application Synthetics, Browser Synthetics, End User monitoring, and Internet Insights, administrators greatly improve response times and customer experience. Here is a brief description of those features:

Network and Application Synthetics – Provides Active monitoring of network and applications from cloud agents and Enterprise Agents.

(4) https://www.thousandeyes.com/blog/troubleshooting-cloud-services-cisco/

Browser synthetics – Are used to emulate a user operating a computer browser. Browser synthetics simulate users interacting with a website or application. It is run from cloud agents or enterprise agents deployed in a client environment to more quickly isolate root cause of application downtime.

End user monitoring – Provides an end user perspective of application performance, as well as LAN, WAN and internet performance from employee laptops and desktops. It delivers on-demand and real-time visibility of SaaS and internally hosted applications, and system health.

Internet insights – Manages Digital experience at internet scale that leverages internet telemetry data to rapidly identify, escalate, and solve issues.

The Internet Outage map is a particularly useful dashboard view designed to provide up to date information on the health of the internet and possible impacts to your services. The Internet Outages Map in Figure 4 below gives an at-a-glance visualization of global Internet health over the prior 24 hours, showing the frequency of Internet outages and service outages as seen across ISP, public cloud, and edge service networks. This type of visualization can help an administrator quickly understand if an ongoing outage inside a network or application provider is the source of specific performance issues.

Figure 4 – ThousandEyes Internet Outage Map
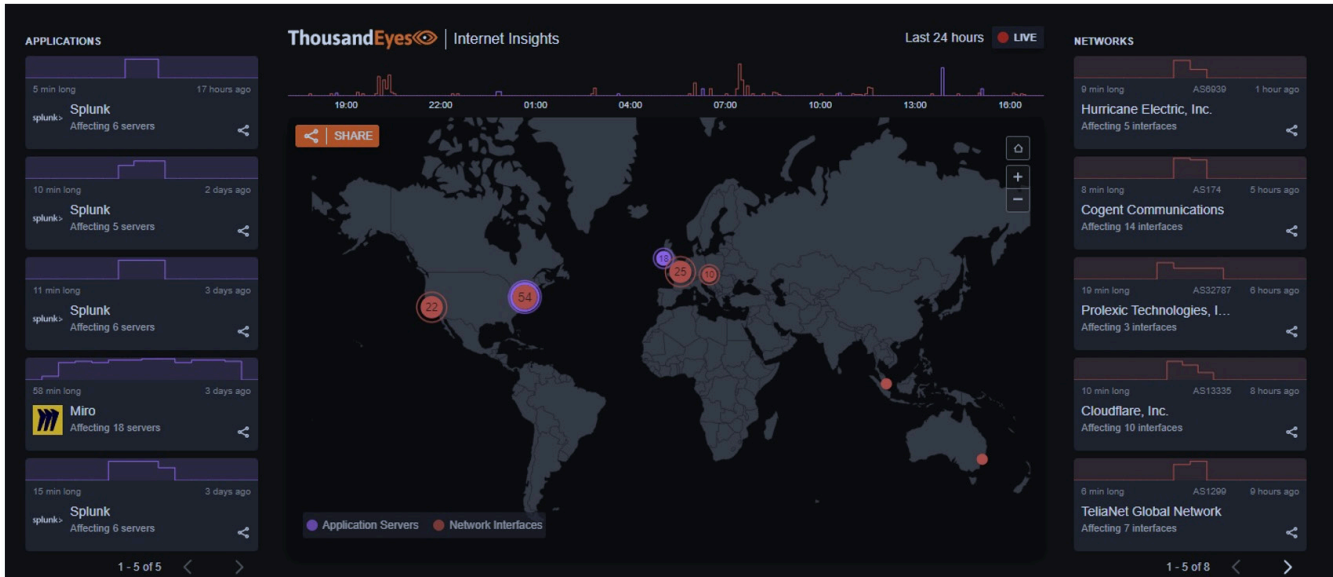
Another interesting and useful visualization is captured below in figure 5. ThousandEyes allows you to see multiple services simultaneously and the status of those services in a single view. Utilizing their patented cross-correlation technology one can see correlated information from multiple services at the same time. This type of view allows administrators to drill down faster and with more ease to identify potential issues impacting crucial services impacting the user experience. While these are all just sample views, they are great illustrations of the power of the ThousandEyes platform.

Figure 5 – ThousandEyes Correlated Services Dashboard
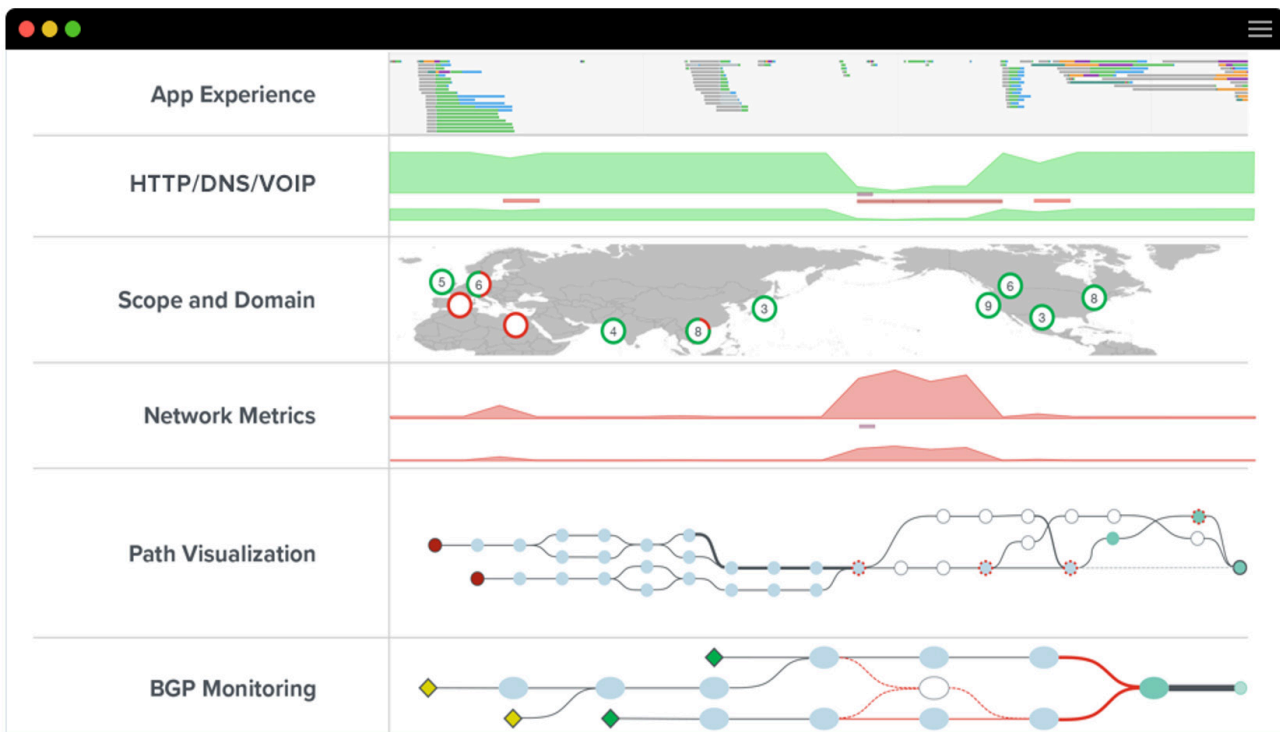
CONCLUSION

ThousandEyes is a next generation management platform designed to empower network teams to see, understand, and improve the digital experience in the new era of hybrid cloud enterprise architecture. The platform delivers on its name by leveraging Cloud, Enterprise, and End User Vantage Points and a strong AI-based correlation engine to provide comprehensive network visibility, decision support, and remediation capability. Cisco ThousandEyes has an impressive client list to back up its track record including the likes of Mastercard, HP and ServiceNow to name a few. By adding ThousandEyes to the IT operations arsenal, any organization can achieve improved user and customer experience and regain control of the network.