Monitoring Software-Defined WAN With CA Performance Management and Virtual Network Assurance

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Executive Summary

Enterprises are transforming networks with software-defined WAN (SD-WAN). The technology facilitates the replacement of MPLS with internet, enables direct access to the public cloud from remote sites, and supports infrastructure consolidation through network functions virtualization. The end result is a network that improves global application performance.

But SD-WAN presents several operational challenges. Many incumbent network management tools are not well suited to monitor and troubleshoot SD-WAN. This white paper explores the unique challenges that SD-WAN presents to network operations, and it examines how CA Technologies' Performance Management enhanced by CA's Virtual Network Assurance (VNA) can help address these challenges.

Enterprises Are Transforming Their Networks With Software-Defined WAN

SD-WAN is the hottest software-defined networking (SDN) technology today. Eighty-eight percent (88%) of distributed enterprises (companies with more than 10 remote sites) either currently deploy SD-WAN today or plan to do so within the next 12 months.[1] With startups and incumbent network infrastructure vendors introducing products, the number of solutions on the SD-WAN market is exploding, and Tier 1 and 2 service providers are getting into the game by partnering with leading vendors.

Early adopters of SD-WAN expect the technology to deliver a broad number of benefits. **Figure 1** reveals that early adopters expect their SD-WAN implementations to improve application performance more than anything else, which should have a trickledown effect on revenue growth, productivity, and customer retention. But enterprises are nearly as enthusiastic about other potential benefits, such as better access to public cloud services, improved network security, and reduced operational costs.

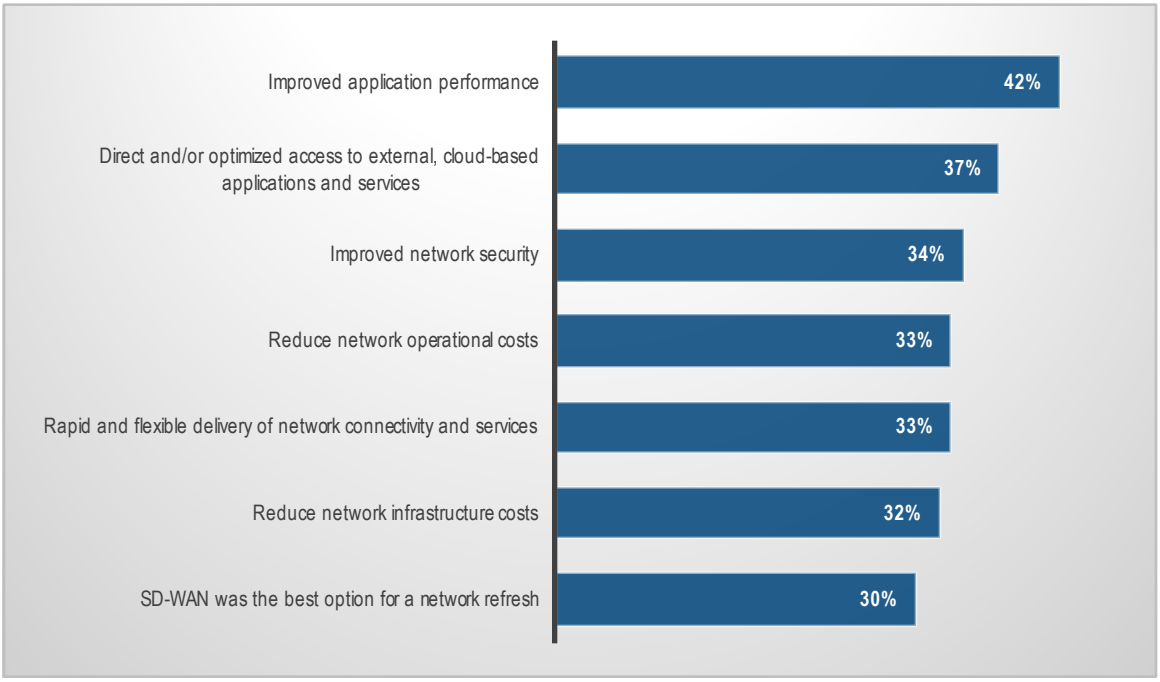

Figure 1. Top anticipated benefits of SD-WAN adoption

[1] EMA, "Next-Generation Wide-Area Networking," July 2016.

SD-WAN is a new technology, and its successful adoption depends on a number of factors. For instance, an organization's IT budget is one factor that affects the success of their SD-WAN initiatives. Recent Enterprise Management Associates (EMA) research found that enterprises with flat or negative IT budget growth tended to realize just two core benefits of the SD-WAN technology: improved public cloud access and reduced infrastructure costs. The companies with growing IT budgets, however, were more likely to expect all of the benefits in Figure 1, suggesting that companies that cut corners with their SD-WAN implementations will not be as successful. One area where enterprises must absolutely not cut corners is SD-WAN operations because enterprises will need to evolve their network management tools and practices to support this new technology.

Eighty-eight percent (88%) of distributed enterprises either currently deploy SD-WAN today or plan to do so within the next 12 months.

SD-WAN operations appear to demand a new set of network management tools. Only 31% of early SD-WAN adopters said incumbent network monitoring and troubleshooting tools were their preferred approach to managing these new networks. Many respondents (41%) preferred to use tools provided by their SD-WAN vendor, and some others (28%) preferred to outsource management to their network service providers. But EMA research has found that the management picture for SD-WAN is even more complex than it appears. IT organizations need to think bigger and look beyond their SD-WAN footprints.

Our survey showed that the typical SD-WAN implementation will only affect 41% to 60% of an enterprise's remote sites. The rest of the enterprise will continue to be connected via legacy technologies. EMA recommends that network operations adopt a unified approach to managing and operating this mixed environment and use consolidated tools that can offer visibility into both SD-WAN and legacy networks. This unified approach is essential. EMA research shows that as network teams add more monitoring and troubleshooting tools, they become less effective at network problem detection and their networks become less stable.[2] Therefore, the best-practice approach to SD-WAN is to extend existing monitoring tools to support SD-WAN and enable end-to-end network operations.

Architectural Changes Enabled by SD-WAN

As enterprises implement SD-WAN, their WAN architecture changes dramatically. This in turn impacts network monitoring in multiple ways. First, SD-WAN enables enterprises to directly connect their remote sites to public cloud services. Fifty-five percent (55%) of enterprises prefer to connect remote sites directly to the public cloud, which represents a major architectural shift. Most cloud services are accessed via the internet, and enterprises have traditionally routed internet-related traffic via MPLS to a central data center where it could connect securely to the internet. Such a backhauled approach to internet connectivity, however, introduces unacceptable levels of latency, jitter, and packet loss to critical applications that have migrated to the public cloud. SD-WAN facilitates direct cloud access via its hybrid connectivity technology and its ability to apply distributed network security services across multiple remote sites. As SD-WAN supports the migration of critical applications to the cloud, network monitoring tools must provide insight into these new architectures. Network operations will need tools that can trace the root causes of performance problems to the cloud provider, the service provider network, or internal enterprise infrastructure.

[2] EMA, "Network Management Megatrends 2016: Managing Networks in the Era of the Internet of Things, Hybrid Cloud, and Advanced Network Analytics," April 2016.

Enterprise use of public internet connectivity is about more than cloud access, however. The internet is increasingly used as the primary network connection in remote sites. Among enterprises that are adding more internet connectivity to their WAN, 74% will use it to replace traditional managed WAN services like MPLS connectivity. However, the average organization will make this change in only 45% of their sites. The majority of these companies will continue to have a mix of public and private WAN connections, and they will need monitoring tools that provide visibility into both internet and MPLS connections and the applications that traverse them.

EMA research shows that as network teams add more monitoring and troubleshooting tools, they become less effective at network problem detection and their networks become less stable.

Consolidated remote site network infrastructure is another architectural evolution enabled by SD-WAN. Enterprises now prefer to consume most remote site network infrastructure as virtual network functions. As **Figure 2** demonstrates, virtual private network (VPN) gateways, WAN optimization controllers, and network address translation gateways are the most popular targets for this network functions virtualization (NFV). But even critical capabilities like network security and routing are popular targets for virtualization. Many SD-WAN solutions offer native and third-party virtual and cloud-based network services, too. Monitoring tools must be able to be tuned to provide visibility into these virtual network functions and the hardware or cloud-based services that host them.

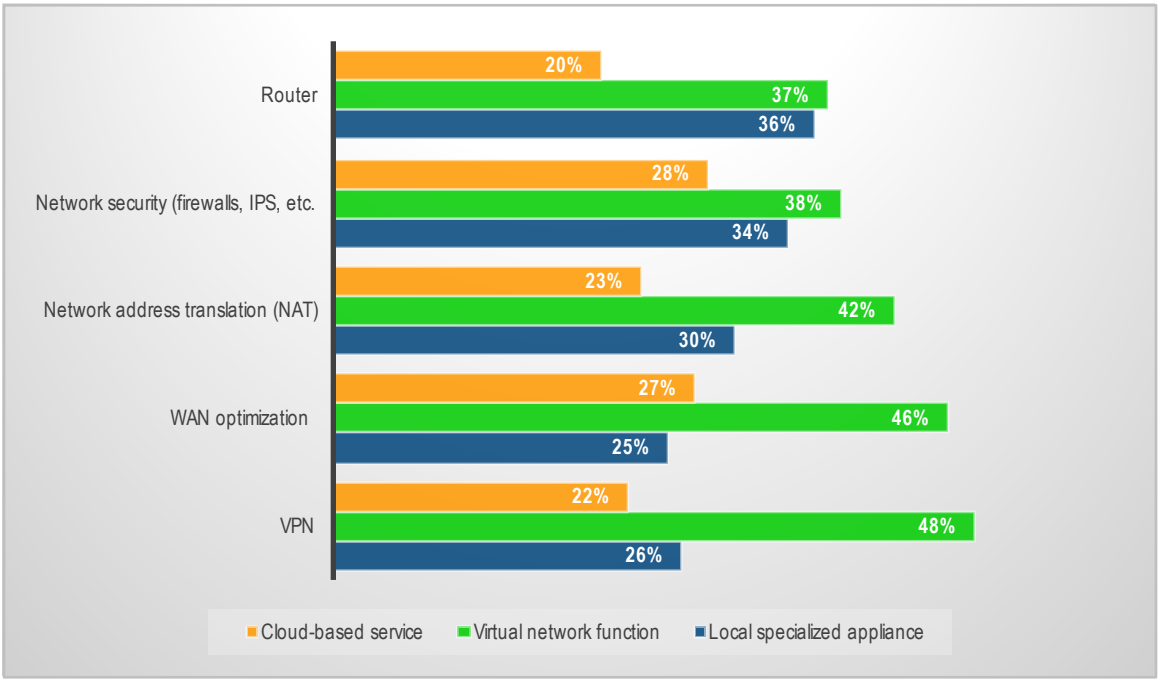

Figure 2. Enterprise preferences for consuming network functions and services in remote sites

Top Operational Challenges of SD-WAN

With SD-WAN, enterprises are re-architecting their networks with heavy use of the internet, direct cloud access, and network virtualization. Network operations centers will need to evolve their tools to cope with these changes. Through our research, EMA has identified several areas of concern that network managers should watch carefully.

The number one management concern of early SD-WAN adopters (42% of respondents) was the management of virtual network functions, and it was especially of concern to enterprises in the SD-WAN planning and design stage (62%).[3] As mentioned earlier, SD-WAN solutions often include native and integrated third-party virtual network functions. These virtual elements replace dedicated appliances with software running on off-the-shelf servers or multifunction appliances. Network monitoring tools must be able to collect telemetry from the virtual network functions and the hardware that hosts them. These tools must also track and model how these network functions are service-chained together so that network managers can understand how traffic flows from function to function and identify which element is the source of potential trouble. Furthermore, some of the network functions available in an SD-WAN solution may be cloud-based, so network monitoring tools must also collect telemetry from these cloud-based network and security services.

SD-WAN technology is designed to make intelligent decisions about forwarding traffic across multiple provider networks. Network managers will need to validate this SD-WAN intelligence by maintaining visibility into the networks delivered by their various providers. This was the number two management concern of early SD-WAN adopters (37% of respondents). SD-WAN will forward traffic over multiple links based on policies and network conditions. To assure high-quality network services, network managers need monitoring tools that can provide visibility into which applications are served by which service provider's networks, and they need workflows that can pinpoint whether service problems are traceable to the enterprise's infrastructure or the provider's network.

The need for onsite IT staff to manage new SD-WAN infrastructure was the third-highest concern for early adopters (33%). IT organizations are already stretched thin: A lack of skills and resources was cited as the biggest challenge to successful WAN engineering and operations today.[4] Most remote sites where SD-WAN solutions are deployed lack onsite IT staff. Therefore, SD-WAN solutions should support zero-touch IT, and many enterprises will need monitoring tools that establish visibility without onsite staff deploying remote probes. These tools should be able to collect metrics from remote SD-WAN installations via APIs, software probes, and other approaches that can be implemented remotely.

Unified performance monitoring of SD-WAN and legacy WAN technology was the fourth leading management concern of early SD-WAN adopters (32%). Legacy WAN technology is not going away. As mentioned earlier, the typical SD-WAN deployment will only cover 41% to 60% of an enterprise's total number of remote sites. Enterprises will need network management tools that help them troubleshoot connectivity between a remote site enabled by SD-WAN and another remote site that uses legacy WAN technology. They need tools that can provide consistent monitoring and troubleshooting across legacy WAN infrastructure and newly deployed SD-WAN infrastructure.

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[3] EMA, "Managing Tomorrow's Networks: The Impacts of SDN and Network Virtualization on Network Management," December 2015.
[4] EMA, "Next-Generation Wide-Area Networking," July 2016.

Better SD-WAN Monitoring Through CA Performance Management enhanced by CA Virtual Network Assurance

CA Technologies offers one of the most scalable and comprehensive approaches to unified monitoring of performance of SD-WAN and legacy WAN technologies. And it delivers this capability without requiring network operations teams to adopt and learn a new management tool.

CA Performance Management 3.1 is a highly scalable and adaptable network availability and performance monitoring platform. It can monitor up to four million items at one-minute intervals and normalize the data it collects into a standard format for presentation to network operations on a customizable dashboard.

CA Virtual Network Assurance (VNA) 2.1 is CA's SDN and network virtualization monitoring engine. It serves as a gateway that integrates with other CA network management products to provide visibility into SD-WAN and network virtualization technologies. VNA normalizes SD-WAN monitoring data and provides relationship monitoring between SD-WAN and legacy WAN elements, giving network administrators an end-to-end view of mixed environments.

CA Technologies' combination of Performance Management 3.1 enhanced with Virtual Network Assurance 2.1 offers one of the most scalable and comprehensive approaches to unified monitoring of performance of SD-WAN and legacy WAN technologies.

CA Performance Management will help address concerns with the management of virtual network functions. It is designed to monitor relationships among network elements (physical, virtual and logical), rather than just monitoring individual device metrics. Thus, network administrators can understand and monitor the application service chains that link together virtual network functions. This visibility is important because it enables network operations to understand how suboptimal conditions with one network element impacts other elements in the application service chain.

CA Performance Management provides insight into the individual provider networks that SD-WAN technology abstracts for hybrid WAN connectivity. It validates the routing and forwarding decisions made by the SD-WAN solution and it correlates application performance issues with the offending service provider network, providing simple health indicators and dynamic context dashboards with minimal clicks to triage. These new monitoring capabilities remove the complexity inherent in SD-WAN connectivity abstraction and validate the forwarding decisions of an intelligent SD-WAN solution.

With network teams already stretched thin, it is imperative that organizations use existing experience, processes and workflows to take on the complexity that comes with any new technology. CA Performance Management offers one converged operational user interface (UI) providing deep visibility (traffic, flow, trends, performance, fault, systems, apps) across legacy and modern network technologies. With CA Performance Management, network operations will be able to manage new SD-WAN infrastructure without disruption.

VNA's integration with Performance Management automatically adds an SD-WAN tab to Performance Management's dashboards, allowing network managers to manage legacy WAN and SD-WAN technology with the same workflows and processes they use with legacy WAN management. This integration addresses concerns about unifying management of SD-WAN and legacy WAN infrastructure.

EMA Perspective

Enterprises are transforming their WANs with SD-WAN solutions to derive a broad set of benefits. Most importantly, they are looking to SD-WAN to improve application performance. Furthermore, they are using SD-WAN to facilitate direct cloud access from remote sites, to replace or supplement MPLS with the internet, and to consolidate WAN infrastructure with virtual network functions and cloud-based services.

While many enterprises view SD-WAN as a transformational technology, they are uncertain that their existing network monitoring tools can validate this improvement and manage this new infrastructure. Very few of them are using their existing network monitoring tools to operationalize SD-WAN. And early adopters of SD-WAN have identified several top management concerns: management of virtual network functions, management of abstracted connectivity, a need for onsite IT in the branch, and end-to-end management of SD-WAN and legacy networking. Enterprises should be aware of each of these challenges as they evaluate their network monitoring tools for SD-WAN. CA Technologies' combination of Performance Management 3.1 and Virtual Network Assurance 2.1 offers a comprehensive and highly scalable solution for SD-WAN network monitoring.

CA continues to expand its network monitoring capabilities through a converged platform for improved end-to-end visibility across traditional network technologies and the latest SDN architectures.

CA continues to expand its modern network monitoring capabilities through a converged platform for improved end-to-end visibility and coverage of traditional network technologies as well as the latest SDN architectures in the market today. CA's solution also extends its capabilities to virtual customer premise equipment (vCPE) and software-defined data center (SDDC) use cases for comprehensive service assurance from the enterprise to the cloud.

About CA Technologies

CA Technologies (NASDAQ:CA) creates software that fuels transformation for companies and enables them to seize the opportunities of the application economy. Software is at the heart of every business in every industry. From planning, to development, to management and security, CA is working with companies worldwide to change the way we live, transact, and communicate – across mobile, private and public cloud, distributed and mainframe environments. Learn more at www.ca.com.

About Enterprise Management Associates, Inc.

Founded in 1996, Enterprise Management Associates (EMA) is a leading industry analyst firm that provides deep insight across the full spectrum of IT and data management technologies. EMA analysts leverage a unique combination of practical experience, insight into industry best practices, and in-depth knowledge of current and planned vendor solutions to help EMA's clients achieve their goals. Learn more about EMA research, analysis, and consulting services for enterprise line of business users, IT professionals, and IT vendors at www.enterprisemanagement.com or blogs.enterprisemanagement.com. You can also follow EMA on Twitter, Facebook, or LinkedIn.

Corporate Headquarters:
1995 North 57th Court, Suite 120
Boulder, CO 80301
Phone: +1 303.543.9500
Fax: +1 303.543.7687
www.enterprisemanagement.com

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