Building a Cloud-Centric, Hybrid Network With Software-Defined WAN

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Executive Summary

Distributed enterprises are discovering that traditional wide-area networks (WANs) no longer meet their business requirements. Cloud adoption, business growth, and the changing nature of applications are forcing network infrastructure teams to adopt new hybrid WAN architectures that rely more on broadband internet for primary network connectivity. Software-defined WAN (SD-WAN) is a new class of network technology that has emerged to meet these new architectural requirements. This paper explores how distributed enterprises are using SD-WAN to build a next-generation network.

Agile, Cloud-Centric Enterprises Require a New WAN

In a traditional wide-area network (WAN) a distributed enterprise connects its remote sites with private or managed network connections, which offer dedicated and isolated connectivity with service-level guarantees. Today's most common example of this approach is a network built with Multi-Protocol Label Switching (MPLS) technology.

Today many distributed enterprises are finding that an MPLS-centric approach to networking no longer serves them adequately. For one thing, adoption of external cloud services, such as software as a service (SaaS) and infrastructure as a service (IaaS), is driving architectural change in the WAN. Quite often the best and only way to connect users to the cloud is through the internet. Many enterprises typically route internet-bound traffic through a data center for security screening, but such backhauling adds latency to cloud applications. In fact, EMA research has found that 55% of enterprises now allow their remote sites to access cloud services directly.[1]

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The nature of application traffic is also affecting WAN architecture. EMA's new research has found that secure Web applications (i.e., HTTPS-based applications) are the third biggest consumer of bandwidth on enterprise networks today. More than half of enterprises (52%) prefer to forward these applications via the internet, rather than MPLS and other private network connections.

Furthermore, distributed enterprises are seeing a rising demand for more network connectivity and higher bandwidth. On the connectivity side, EMA has found that 72% of distributed enterprises plan to increase the number of remote sites that are connecting to their WAN over the next 12 months, including 22% of organizations that say that growth will exceed 25%. Bandwidth demand is also rising. Eighty-four percent (84%) of enterprises have told EMA that the number of endpoints connecting to their WAN from remote sites is rising, and 28% classified this growth as significant. Thirty-nine percent (39%) of these organizations are upgrading bandwidth to accommodate this device growth.

All of these changes are driving enterprises to develop a new approach to architecting the WAN, and the internet is a core part of this new WAN. Forty-six percent (46%) of enterprises are increasing the average number of internet connections at their remote sites, and nearly three-quarters of those enterprises (74%) say that those internet links will be used as primary network connections in place of MPLS and other managed network services.

[1] Unless otherwise noted, all statistical data cited in this paper is from EMA's July 2016 report, "Next-Generation Wide-Area Networking."

EMA asked distributed enterprises to identify the drivers behind their use of internet for primary WAN connectivity. Thirty-eight percent (38%) said it enables connectivity to the cloud, and 31% said it offers higher bandwidth. Additionally, 29% said it provides faster provisioning and service agility, which is important to those organizations that are growing the number of remote sites. In some regions where managed WAN service options are outdated and poorly performing, the internet can serve as a superior option. In fact, 37% of organizations say superior performance drove their migration to the internet.

Enterprises aren't completely abandoning traditional WAN technology, however. In fact, the expanded use of the internet will actually lead the industry into an era of hybrid WANs. On average, only 45% of remote sites are affected by this transition from managed connections like MPLS to the internet. The majority of sites will continue to rely on managed WAN connections, especially when those sites generate traffic from applications like storage replication, big data collection and analytics, and enterprise resource planning. Moving forward, these enterprises will need technologies that enable a new hybrid WAN.

Software-Defined WAN Technology Enables Hybrid WAN

Software-defined WAN (SD-WAN) is a technology that can enable these new hybrid networks. SD-WAN is an overlay technology that starts with a centralized controller function for programmatic network management. Quite often, these controllers enable IT administrators to provision and manage network connections through a graphical user interface (GUI), rather than through a command-line interface (CLI).

SD-WAN solutions also offer dynamic hybrid WAN connectivity. This feature typically enables path control over multiple WAN connections, both managed WAN and internet. Through the controller, IT administrators can set policies that dictate how traffic is forwarded from a remote site based on users, applications, network conditions, and other factors.

Depending on the solution, SD-WAN offers many other helpful features. Many early adopters value the technology's ability to offer device consolidation via virtual and cloud-based network and security services. This consolidation can reduce costs and increase network agility.

The technical and business benefits of SD-WAN are broad, according to early adopters of the technology. The ability to impose policy-based path control on WAN traffic can give enterprises more control over application performance. In fact, many early adopters of SD-WAN (42%) say that improved application performance is the number one driver of their use of the technology. The number two driver is SD-WAN's ability to facilitate direct and optimized access to external cloud services (37%). Early adopters also recognize SD-WAN's ability to improve network security (34%) and enable rapid and flexible delivery of network connectivity and services (33%).

Early adopters of SD-WAN (42%) say that improved application performance is the number one driver of their use of the technology.

SD-WAN can also help the bottom line. Early adopters cited reduced operational expenses (33%) and reduced capital expenses (32%) as leading drivers of adoption. However, cost reduction is not a priority. Enterprises view SD-WAN and other software-defined networking (SDN) solutions as transformational technologies. According to early adopters of SDN and SD-WAN,

the number one business goal for software-defined network transformation was improved end-user productivity (28%), followed by revenue growth (21%), better security (17%), and improved customer and brand loyalty (13%). Just 3% of enterprises named cost reduction as their top goal with SDN and SD-WAN.[2]

Overall, SD-WAN has the ability to address a variety of emerging networking requirements for distributed enterprises. It allows companies to leverage the affordable, higher-bandwidth connectivity of the internet. It provides network security through centralized control and virtualized and cloud-based security services. It can automate the tasks involved in connecting new sites and new users through centralized control and automation. And it allows IT organizations to address the needs of customers more quickly by accelerating the delivery of network services at remote sites.[3]

How to Succeed With SD-WAN

As with any new technology, enterprises will need to carefully assess their ability to plan, implement, and operate SD-WAN, especially since many enterprises have so far struggled to do so. EMA research has found that only 30% of early adopters say their existing network planning and engineering tools fully support SD-WAN. Only 29% of enterprises have availability monitoring tools to fully support the technology, and just 33% have performance monitoring tools that are ready for it.

While some enterprises can succeed with their existing network engineering and management tools, many will need to rethink their approach when implementing SD-WAN. EMA asked early adopters to identify their preferences for engineering and operations. Partnerships with SD-WAN vendors and network service providers appear to be very important.

Forty-one percent (41%) of SD-WAN adopters prefer to use network planning and engineering tools provided by their chosen SD-WAN vendor, and 41% also plan to use network monitoring and troubleshooting tools provided by their vendors.

Meanwhile, 32% adopters say they prefer to leverage planning and engineering tools and services from their network service provider, and 28% prefer to outsource SD-WAN monitoring and troubleshooting to their network service provider.

SD-WAN can also pose some unique operational challenges to network infrastructure teams. Early adopters have identified four top areas of concern. Forty-two percent (42%) struggle with management of virtual WAN elements, such as virtual firewalls or virtual routers. Given the technology's use of hybrid connectivity, 37% of enterprises are concerned about how they will manage multiple service providers. In other words, it's often a challenge to determine which provider deserves the blame when connectivity is virtualized across heterogeneous networks. Nearly one-third (32%) worry that SD-WAN will require onsite IT staff, and 32% are worried about their ability to integrate their management of SD-WAN infrastructure and legacy network infrastructure.[4] These are challenges that enterprises should keep in mind as they plan and then implement SD-WAN. They should work closely with their vendors and network service providers to make sure these problems do not affect them.

[2] EMA, "Managing Tomorrow's Networks: The Impacts of SDN and Network Virtualization on Network Management," December 2015.
[3] Ibid.
[4] Ibid.

EMA Perspective

Network infrastructure teams are encountering growing demands for additional network connectivity, more bandwidth, and direct access from remote sites to external cloud services. They need a new approach to WAN architecture. SD-WAN can help enterprises with this transition. The technology provides dynamic, hybrid WAN connectivity across MPLS and internet links. It also enables direct cloud access and simplifies network operations through centralized management and automation.

Early adopters of SD-WAN have experienced improved productivity, revenue growth, better security, and better customer loyalty as a result of software-defined infrastructure. And from a technical perspective, they expect SD-WAN to enable better application performance on the WAN.

The majority of early adopters have found that existing network engineering and management tools are not ready for SD-WAN. Enterprises should identify the right partners to ensure their planning, implementation, and operation of SD-WAN is successful.

SD-WAN can offer tremendous benefits, but enterprises should carefully evaluate their options for implementing the technology. The majority of early adopters have found that existing network engineering and management tools are not ready for SD-WAN. Enterprises should identify the right partners to ensure their planning, implementation, and operation of SD-WAN is successful.

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