



Optimizing Remote Worker Connectivity to Cloud Applications Using SD-WAN Gateways

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INTRODUCTION

In the 2019 Frost & Sullivan Global Cloud end-user survey, 80% of the survey respondents agreed to the statement, “a cloud strategy is essential to remaining competitive in our industry.” In the past five years, cloud has become an integral part of business’s digital transformation strategy, with adoption rates increasing for all types of clouds. In our survey, 57% of the respondents said they have deployed Cloud IaaS, and 41% said they currently use SaaS applications. Increasing application availability or uptime and delivering applications faster to users are among the top five reasons businesses are embracing cloud. However, implementing and maintaining a secure, high-performing WAN that allows for efficient access to cloud-based applications can be costly and complex for enterprises, whether large or small. SD-WAN solutions automate the process of network selection and put traffic steering control in the hands of your organization’s network administrators to do direct internet breakout to cloud-based applications.

While the ability to connect to cloud over public internet links (using any device and from anywhere) is a major factor driving the adoption of SD-WAN, public internet is still best effort and comes with several performance challenges such as latency, packet loss, and inherent security risks. SD-WAN vendor solutions available in the market address these challenges by deploying a virtual instance of their SD-WAN solution in the cloud point of presence (POP) nearest to the destination application. This allows them to implement SD-WAN features throughout the network, from branch site to cloud, ensuring optimal performance and reliability. Vendors can also integrate their SD-WAN solution into the cloud partner’s infrastructure to provide a quick on-ramp to cloud data centers. For example, several vendors have integrated their SD-WAN solution with Azure Virtual WAN to optimize connectivity to Microsoft Azure cloud. While these options are beneficial and part of a complete SD-WAN solution to bring users closer to cloud applications, they are not the whole solution.

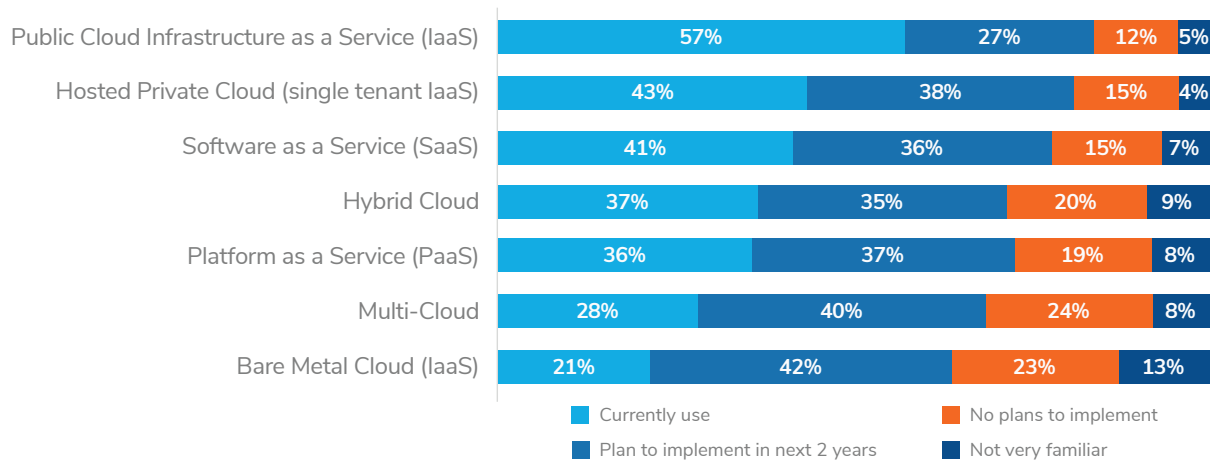
The VMware solution includes the capabilities listed above but expands upon them. VMware SD-WAN™ by VeloCloud® offers the unique approach of a cloud-hosted SD-WAN service with cloud-based gateways that complement branch deployments. VMware SD-WAN Gateways offer optimized paths for users accessing cloud IaaS and SaaS applications because they are located at major POP locations around the world, eliminating the challenges of deploying and maintaining SD-WAN appliances in the cloud. The SD-WAN gateway approach has become even more significant in the current COVID-19 situation as remote workers connect to cloud over residential broadband links. In this paper, we review the performance and operational benefits of the VMware SD-WAN Gateways in enabling optimized and reliable connectivity to the cloud.



SD-WAN AS AN ENABLER FOR CLOUD CONNECTIVITY

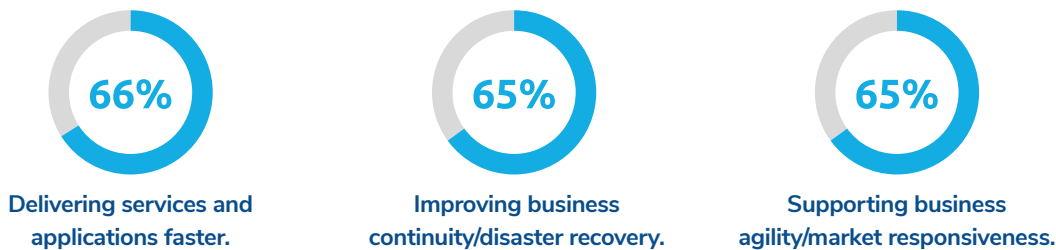
Cloud adoption continues to grow across business segments and industries. Exhibit 1 shows the adoption rates for various cloud services indicated by respondents to the 2019 Frost & Sullivan cloud survey. Cloud IaaS (57%) leads the adoption curve, followed by hosted private cloud (43%) and SaaS (41%). The data in the chart also indicates that hybrid cloud and multi-cloud are on the rise, with 40% of the respondents stating they plan to implement multi-cloud in the next two years. Businesses use an average of 4.5 deployment models for their workloads, including premises-based servers, managed services, and cloud. They also use, on average, 2.2 public cloud providers.

Exhibit 1: Cloud Adoption Trends



Source: 2019 Frost & Sullivan Cloud End-user Survey

In the same survey, respondents indicated that the top three business drivers for deploying cloud solutions include:



As cloud becomes an integral part of enterprise digital transformation, ensuring optimized and secure connectivity to cloud applications is extremely critical. Cloud connectivity is one of the key reasons enterprises are evaluating SD-WAN services. The ability to use public and private networks in a hybrid WAN and make real-time changes to routing based on pre-defined policies is valuable to enterprises. As with the choice of cloud infrastructure for enterprise applications, the networks connecting various cloud-based applications do not have to be one type. For example, while MPLS could be the right choice to connect to an ERP application in a hosted private cloud, for reasons of security and compliance, internet links could suffice for accessing a less-critical SaaS application. The enterprise predefines business policies in an SD-WAN solution to specify which cloud applications are suitably accessed directly through the internet versus backhauled to a hub site. In a recent Frost & Sullivan SD-WAN survey, 78% of the respondents stated the ability to achieve superior WAN performance as a key reason to deploy SD-WAN.

THE VALUE OF EXTENDING SD-WAN TO REMOTE WORKERS

Even before the COVID-19 pandemic, remote working or work-from-home (WFH) was a growing trend in the past decade. While the tech industry has led the way in embracing part-time and full-time remote working, a wide range of businesses that rely on knowledge workers has adopted remote working for flexibility, productivity and harnessing the best talent from across the world. According to the U.S. Bureau of Labor Statistics, 26 million Americans—about 16% of the total workforce—now work remotely at least part of the time.¹ In its 2020 State of Remote Work report, Buffer Inc. surveyed 3,500 remote workers, 98% of whom stated they would like to work remotely at least some of the time for the rest of their careers.²

Frost & Sullivan predicts that the lessons learned from the pandemic, the benefits of sourcing talent and resources based on qualifications (without the location limitations), and the cost savings for businesses from reduced office infrastructure will speed up remote working adoption across industries. A recent survey by the Kung Group of more than 500 founders of venture-backed companies revealed that 70% of the founders reported that once the office opens, they would let some or all of their employees work remotely at least part time.³ Facebook, a company that has been a big believer of work from office, has stated about 50% of the company's workforce could be remote in the next 5-10 years.⁴

The power of cloud and connectivity has become especially apparent during the current COVID-19 situation, when global organizations had to quickly transition the majority of their workforce (wherever applicable) to a remote working environment. With businesses across industries embracing the public cloud to host key applications, and with advances in residential broadband and wireless speeds, remote workers can access most enterprise applications from home. However, as remote workers compete for bandwidth with kids attending virtual classrooms and others at home trying to stream videos, optimizing and prioritizing business applications on home networks is even more critical.

SD-WAN solutions leverage real-time performance monitoring of transport networks to make application-aware, policy-based network link selection and steer traffic over the best available link.

In scenarios that rely on a single network link and where sufficient bandwidth is not available to support all applications, SD-WAN technology optimizes the available bandwidth by:

- Giving higher priority to business traffic compared to social media sites and entertainment channels, such as YouTube or Netflix.
- Continuously monitoring the traffic path for packet loss and delay, and applying forward error correction to reduce packet loss and increase throughput.
- Using traffic-handling techniques to throttle less-critical application traffic.

These advanced features ensure that the WAN is always available and delivers superior performance to support critical enterprise applications. With the rapid increase in remote workers and the fact that these employees are accessing the same enterprise applications as office-based workers, it is imperative that remote workers have the same superior user experience while accessing enterprise applications as they would in an office).

VMWARE SD-WAN: FAST-TRACKING END-USER CONNECTIVITY TO THE CLOUD

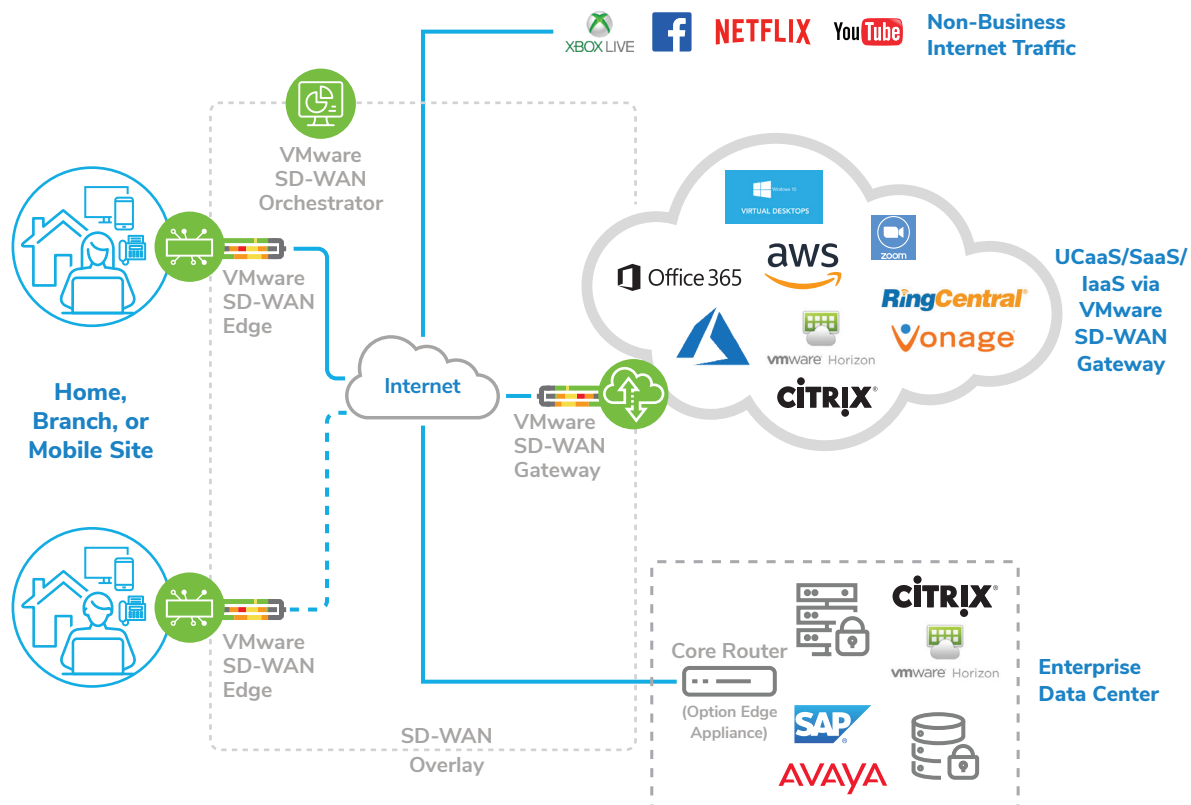
VMware SD-WAN is a cloud-delivered SD-WAN solution that provides unprecedented flexibility while connecting to cloud-based applications through its SD-WAN Gateway approach. The globally distributed VMware SD-WAN Gateways create a Network of Clouds that bridge the gap between users and cloud-based applications.

VMware's Network of Clouds consists of 2,000+ stateless, horizontally scalable VMware SD-WAN Gateways that are hosted in 100+ POPs. The rich ecosystem of partner POPs where the Gateways are deployed and/or integrated with partner platforms includes:

- Leading cloud IaaS providers (for example, Azure cloud).
- SaaS clouds (for example, Microsoft Office365).
- Security clouds (for example, CheckPoint cloud).
- Telco clouds (for example, AT&T MPLS POPs).
- Network exchanges (for example, Equinix).

The global footprint of VMware SD-WAN Gateways hosted in the POPs of diverse partners ensures that business users, no matter where they are and what applications they are trying to access, are just a gateway away from optimized connectivity. VMware SD-WAN Dynamic Multipath Optimization™ (DMPO), along with its Cloud Gateways, delivers this optimized connectivity and assured application performance for work-from-home users over a congested last mile.

Exhibit 2: VMware SD-WAN for Work-from-Home Architecture



Source: VMware

Optimized Connectivity to the Cloud

In the Frost & Sullivan cloud survey, “increase application availability” was rated the #1 reason businesses deploy cloud. The COVID-19 pandemic will further strengthen businesses’ dependence on cloud to improve business continuity. Traditional WAN architectures such as MPLS VPNs, which are widely used to connect globally distributed enterprises, do not provide an efficient way to connect the ever-increasing remote working workforce to cloud-based applications. MPLS WAN architecture assumes that all business-critical applications reside in the enterprise data centers, which branches connect to over a private WAN. Hence, branch network traffic is still routed via headquarters or hub locations (to ensure data security and compliance), thus adding delays. With remote workers increasingly accessing cloud applications over internet links, the inefficient “hairpin” model of traffic being routed via the enterprise data center no longer applies.

“ VMware SD-WAN Gateways offer optimized paths for users accessing cloud IaaS and SaaS applications, as they are located at major POP locations around the world, eliminating the need to backhaul traffic to the data center.

One-click Security Service Insertion

As businesses scale out remote work sites, ensuring security for these sites over public internet links is critical. VMware SD-WAN enables businesses to deploy cloud-based security features on the go through partnerships with vendors such as Palo Alto Networks and CheckPoint. Businesses can connect their users directly to any of these security vendors’ Cloud Web Security Gateways.

Built-in Resiliency to Ensure Business Continuity

The cloud-delivered infrastructure of VMware SD-WAN comes backed by a 99.99% uptime service-level agreement (SLA) with 24x7 automated failure detection to ensure reliable WAN connectivity for your organization. The VMware SD-WAN Gateways are distributed across VMware and its partner POPs in active-active mode, offering inherent resiliency in that each SD-WAN site is assigned to primary and backup SD-WAN Gateways and Orchestrators.⁵ If the primary SD-WAN Gateway fails, the traffic is automatically rerouted to the backup SD-WAN Gateway. Similarly, if the primary VMware SD-WAN Orchestrator fails, the customer can simply log on to the backup Orchestrator.

Increased Visibility for Enterprise IT

VMware SD-WAN Gateways provide visibility into application performance over the network, thus aiding enterprises with application policies and troubleshooting network issues. The Gateway architecture eliminates the need for multiple manual VPNs to be set up between remote worker sites and the cloud, as the Gateway acts as a concentrator to create a single secure connection from branch to the cloud and steers traffic across all available links according to business policies.

THE LAST WORD

The remote working trend is here to stay, and businesses need to adapt to ensure business continuity and stay competitive. No matter what stage of the digital strategy journey your organization is at currently, cloud and SD-WAN technologies have a critical role to play. The VMware SD-WAN solution with its unmatched network of Gateways offers an optimized, efficient and secure approach to enabling end-user connectivity to cloud applications. The following case study of a real VMware customer from the healthcare vertical captures the essence of VMware SD-WAN Gateways in action as the client ramped up to deal with the remote working challenge during the COVID-19 pandemic.



CASE STUDY: KEEPING CRITICAL PATIENTS SAFE AND TREATED USING SD-WAN

Entity name: MD Anderson Cancer Center

Industry: Healthcare, cancer research

Headquarters: Houston, Texas

Number of employees: 20,000 people, including more than 1,600 faculty members.

Website: <https://www.mdanderson.org/>

The mission of The University of Texas MD Anderson Cancer Center is to eliminate cancer in Texas, the nation, and the world through outstanding programs that integrate patient care, research and prevention, and through education for undergraduate and graduate students, trainees, professionals, employees and the public.

MD Anderson is an extension of the University of Texas and is located in Houston. It is both a degree-granting academic institution and the world's leading comprehensive cancer treatment and research center. With faculty and staff working in more than 25 buildings in Houston and many locations around Texas, MD Anderson is one of the largest cancer centers in the world.

MD Anderson began working with VMware in 2019. At that time, MD Anderson had multiple branches connected with commodity broadband and inflexible legacy MPLS. Additionally, turning up a new site was a lengthy and time-consuming process. Many of these sites struggled with poor application performance, particularly when using traditional VPN connectivity over broadband. With no application awareness or per-application quality of service (QoS), radiologists were unable to keep up with analyzing large bandwidth-intensive imagery files in a timely manner – a key metric of their day-to-day job performance.

MD Anderson needed a better solution and decided that SD-WAN was the most promising technology to fix its issues.

“We have partnered with VMware specifically for its SD-WAN solution and have deployed a combination of more than 700 of VC510 and VC540 to extend the same level of user experience to the home as if our employees were working onsite. We are expanding our footprint to 1,000 devices as we continue expanding WFH initiatives in these difficult times of COVID-19. Thank you, Sanjay and the VMware team, for making our transition so seamless and successful.”

Choosing SD-WAN

Phase One of the VMware SD-WAN by VeloCloud rollout occurred over the summer of 2019 in support of 200+ remote offices. With VMware SD-WAN, physicians were able to consistently increase the efficiency of diagnosis for their critical patients, increasing the number of scans per day. Additionally, VMware SD-WAN brought increased resiliency and security. It enabled a flexible and robust network infrastructure, which now allows hundreds of radiologists across the country to seamlessly collaborate.

With SD-WAN, automation and visibility were introduced, allowing deployment to happen quickly and efficiently. Using Zero-Touch Provisioning (ZTP), home office workers could install the VMware SD-WAN Edge themselves. The device would automatically connect to the cloud-based central management tool, the VMware SD-WAN Orchestrator, and immediately the physician, radiologist or staff worker was connected to the corporate network. Using the VMware SD-WAN Orchestrator, network managers were able to see the individual VMware SD-WAN Edges activated and could troubleshoot issues from MD Anderson's headquarters without having to go onsite.

COVID-19 Forces Rapid Change

In March of 2020, the COVID-19 pandemic brought new challenges to MD Anderson, particularly with regards to protecting its highly vulnerable patients and its employees. To limit exposure to the virus, it was decided that a large segment of its employees would move offsite to remote home offices. VMware SD-WAN was a natural fit to provide secure and enhanced connectivity to critical applications.

The team at VMware SD-WAN received the call for help and responded in record time by delivering an initial 500 VMware SD-WAN Edge 510s in a matter of days. Hundreds of edges were urgently shipped prior to receiving the purchase order given the urgency of the situation.

A request for additional VMware SD-WAN Edges soon followed, bringing the total to 1,000 devices. MD Anderson is now handing out the edge appliances and assisting employees with turning them up.

—Emil Patel, LinkedIn

ENDNOTES

1. https://www.bls.gov/news.release/atus.t06.htm#tus_tu_nr6.f.3
2. <https://lp.buffer.com/state-of-remote-work-2020>
3. <https://www.entrepreneur.com/article/351276>
4. <https://finance.yahoo.com/news/facebook-shifting-permanent-home-status-184855849.html>
5. VMware SD-WAN Orchestrator is the centralized management platform for installing, monitoring and managing SD-WAN deployments. The Orchestrator provides in-depth visibility into edge devices and network performance statistics to enable IT administrators to define business policies. The VMware Orchestrator enables one-click provisioning of virtual services in the branch, cloud, or data center.

NEXT STEPS

- ① [Schedule a meeting with our global team](#) to experience our thought leadership and to integrate your ideas, opportunities and challenges into the discussion.
- ② Interested in learning more about the topics covered in this white paper? Call us at 877.GoFrost and reference the paper you're interested in. We'll have an analyst get in touch with you.
- ③ Visit our [Digital Transformation](#) web page.
- ④ Attend one of our [Growth Innovation & Leadership \(GIL\)](#) events to unearth hidden growth opportunities.

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