

Behind the Need for

NEXT-GENERATION SD-WANS

WHITE PAPER

Prepared by
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ABOUT THE AUTHOR

Zeus Kerravala is the founder and principal analyst with ZK Research. Kerravala provides tactical advice and strategic guidance to help his clients in both the current business climate and the long term. He delivers research and insight to the following constituents: end-user IT and network managers; vendors of IT hardware, software and services; and members of the financial community looking to invest in the companies that he covers.

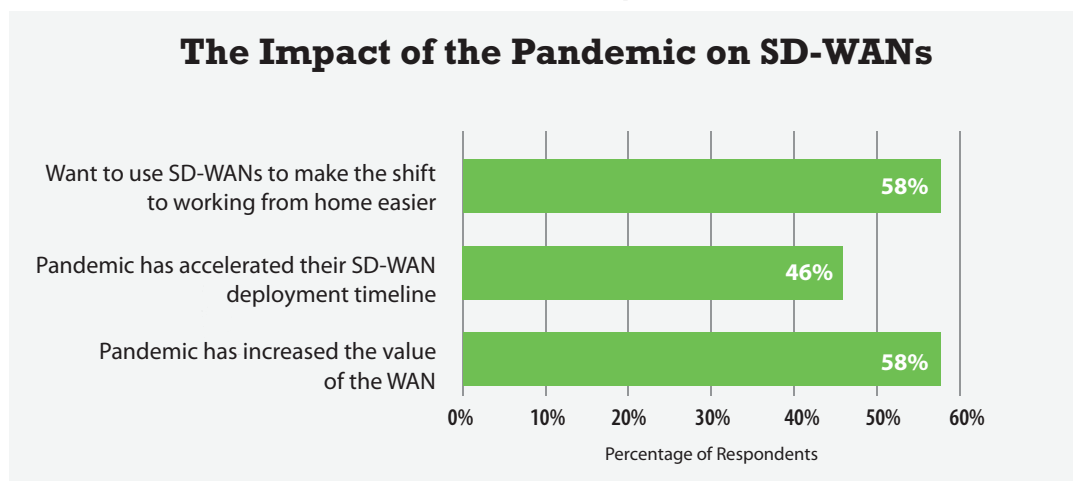
INTRODUCTION: SD-WANS ARE ON THE RISE

Digital transformation, which was first discussed in the late 1990s and accelerated in the mid-2000s, is now moving even faster. The COVID-19 pandemic has added urgency, so plans originally sketched out for years are happening in months. The combination of the pandemic and digital transformation has raised the value of the network, which in turn has accelerated the adoption of software-defined WANs (SD-WANs).

Before COVID-19 started to take hold in March 2020, most companies had long-range digital plans with SD-WANs likely in the mix. Then the world changed in the space of a few days, and those same companies were suddenly struggling to keep business going while most of their employees were working remotely. Although interest in SD-WANs has been strong and growing in recent years, the COVID-19 pandemic has pushed that growth into high gear, as employees are working from locations around the globe. When people return to the office, companies likely will open more branch offices as workers will be more dispersed, increasing the need for SD-WANs.

The recent ZK Research 2020 Work-from-Anywhere Study shows that the pandemic has brought the SD-WAN to the fore ([Exhibit 1](#)). In the study, 58% of respondents said the pandemic has increased the value of the WAN. At the same time, 46% said the pandemic has accelerated their SD-WAN deployment timeline. Even more compelling, 58% want to use SD-WANs to make the shift to working from home easier. This is a marked difference for network value, as historically most business leaders considered the WAN a commodity with no real strategic value. The fact is, even before the pandemic began, for most organizations, the network was integral to the business because the majority of digital building blocks—such as cloud, mobility and Internet of Things (IoT)—are network centric. Industries such as financial services, healthcare, manufacturing and retail require SD-WANs to ensure secure connections among critical assets, locations and employees. Therefore, the COVID-19 pandemic simply accelerated a trend that was already happening.

Exhibit 1: COVID-19 Has Accelerated SD-WAN Adoption



ZK Research 2020 Work-from-Anywhere Study

Businesses that want to stay current need to rethink their network strategies and make SD-WANs a priority.

To meet the needs spelled out above, it seems evident that increased spending will follow. In fact, results from the ZK Research 2020 Work-from-Anywhere Study show that 55% of respondents will increase spending on SD-WANs, sitting alongside cloud, network and endpoint security as top concerns (Exhibit 2).

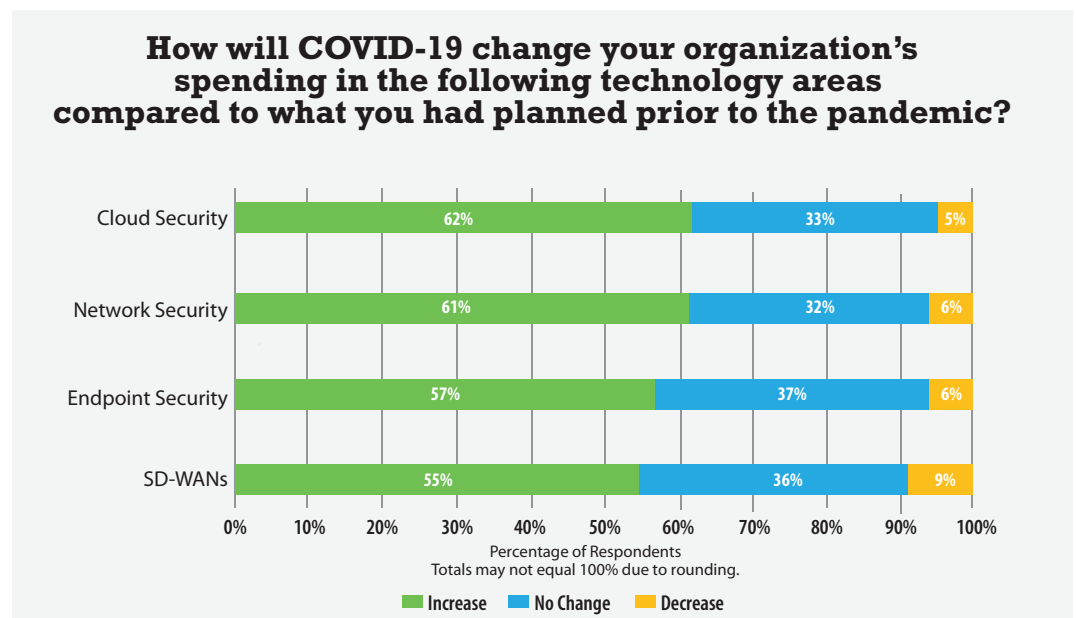
As previously noted, digital transformation started this shift. And because it had been underway for some time, many of the building blocks were already in place. We wouldn't be able to work at home or from a remote location without significant progress on IoT, cloud, mobile and other elements that have increased the utility and value of the WAN. As a result of these developments, the ZK Research Global SD-WAN Forecast has been adjusted to account for the acceleration due to COVID-19 (Exhibit 3). As the forecast illustrates, COVID-19 has accelerated an already fast-growing market, adding \$600 million in 2020 alone and growing to nearly \$20 billion by 2024.

It's clear from the forecast numbers and the survey responses that SD-WANs are now a business imperative. As such, they should be a top priority for business and IT leaders.

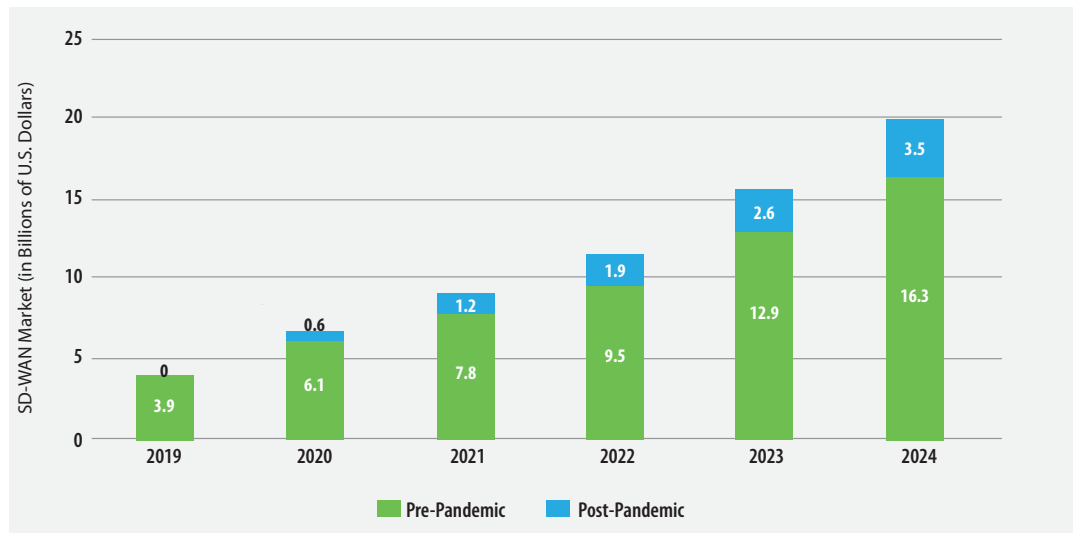
It's Time for Next-Generation SD-WANs

Are today's solutions up to the task? SD-WANs have been available for close to a decade, and they haven't changed much in that time even though the demands on them have. SD-WANs are certainly more modern than the WAN architectures they're intended to replace, which have not evolved for the better part of 30 years.

Exhibit 2: The Pandemic Increases Security and WAN Spending



ZK Research 2020 Work-from-Anywhere Study

Exhibit 3: SD-WAN Deployments Explode

ZK Research 2020 Global SD-WAN Forecast

Therefore, with the dramatic shift in application traffic from an on-premises focus to the cloud, it's time for the next-generation SD-WAN. In this paper, ZK Research reviews SD-WANs and the challenges with legacy solutions; explores the next generation of SD-WANs and how they fill the gaps of current solutions; and makes a few recommendations on what to look for when evaluating SD-WANs.

SECTION II: THE CHALLENGES WITH LEGACY SD-WANs

The initial focus of SD-WANs was to simply shift network transport from expensive Multiprotocol Label Switching (MPLS) connections to low-cost broadband. The need for digital transformation and work-from-home capabilities means that businesses must connect branches, company locations, peoples' homes, public clouds and edge computing devices. Often, all of these connections must happen at once for a single employee who needs to work with a branch office, on-premises company assets as well as resources in the public cloud and on the edge of the network.

As businesses turn to SD-WANs to transform their organizations, the current crop of solutions must evolve. The needs of businesses are outstripping the capabilities of legacy SD-WANs. And although legacy SD-WANs reduced the cost of networking and improved the reliability of the network, they left a number of problems unsolved:

Outdated architecture: Most SD-WAN solutions have maintained packet-based architectures built on Layer 3 policies, which limits app-based networking capabilities. Also, while SD-WANs have improved network visibility, packet-based networks have no application visibility, making it challenging to create app-based service-level agreements (SLAs). Legacy SD-WANs were effective in enabling transport to evolve but not the architecture.

If businesses want to take full advantage of SD-WANs, it's time for the technology to take the next evolutionary step forward.

Manual operations: Legacy SD-WAN vendors have focused on network cost savings, which can be significant. However, the hefty cost of running a network—more than 50% in some cases—comes from operational expenses. Some SD-WAN vendors have improved day-zero and day-one operations through zero-touch provisioning. However, day two remains a struggle because staff still need to conduct ongoing configuration changes manually. The heavy emphasis on manual operations hurts network reliability. In fact, a recent study from ZK Research found that with legacy operations, human errors are the largest cause of unplanned network downtime.

Security as an overlay: Legacy SD-WANs focus on the network, but security remains a series of point products that are effectively “bolted on” to the network. This creates inconsistent policies, increases operational complexity, adds costs and isn't all that effective.

If businesses want to take full advantage of SD-WANs, it's time for the technology to take the next evolutionary step forward. This transition of SD-WAN technology is typical of the way most technology evolves. The first wave of something new involves mimicking the old so that things still feel familiar, and then we eventually figure out how to do things differently. For example, with cloud computing, the first phase lifted and shifted legacy workloads. This approach used the same workloads in different locations. Now, cloud native is the norm, and that enables a whole lot more than the first-gen cloud did. The next-gen SD-WAN should be a network that not only lets companies more efficiently do what they were doing before, but also opens up the floodgates for things that weren't possible with legacy WANs.

The next section offers a glimpse at the capabilities of a next-generation SD-WAN.

SECTION III: INTRODUCING NEXT-GENERATION SD-WANs

If traditional legacy SD-WANs aren't up to the demands of today's business world, what should a next-gen offering look like? It's pretty simple: A new type of SD-WAN should be a no-compromise modernization for the digital era and should include the following aspects:

Application-Defined Networking

No period in the history of computing has had such an effect on the way people use technology. In just a short time, COVID-19 has reshaped the world, and networks have been forced to respond.

The meteoric rise in working from home brought on by the pandemic led to a corresponding increase in the use of cloud apps for all types of tasks, collaboration tools and video. Each one places unique demands on the network. Consequently, the network needs to automatically prioritize the different types of applications and ensure they run without incident.

Next-generation SD-WANs should revolve around the things people and businesses need to do, rather than having people and companies adapt to how the network wants them to work. In short, the network should be application defined.

The automation capabilities of next-generation SD-WANs eliminate the people-driven, labor-intensive heavy lifting required to run a network.

Autonomous Network Operations

Next-generation SD-WANs should take advantage of artificial intelligence (AI), machine learning (ML), network data and business policies to enable a fully autonomous network—without the need for human intervention. With such technology at work, companies can accelerate their digital transformation plans because changing the network won't be the labor-intensive challenge it is today.

Based on one-on-one interviews with network engineers, ZK Research found that the average time to implement a change network wide is about four months. Add a legacy SD-WAN, and that number drops to anywhere from a few days to a week, which is a significant improvement. But a digital business can't wait that long. An SD-WAN with built-in AI and ML can make network changes continuously, acting as a virtual engineer that watches the network 24x7x365. If the intelligence in the next-gen SD-WAN sees a problem or anticipates one, it knows precisely how to fix the issue before it affects the business.

The automation capabilities of next-generation SD-WANs eliminate the people-driven, labor-intensive heavy lifting required to run a network. These manual processes are a silent killer for organizations, as the largest cause of unplanned network downtime is human error. In fact, the ZK Research 2019 Network Purchase Intention Study found that 34% of unplanned downtime comes from engineers making mistakes ([Exhibit 4](#)). A next-generation SD-WAN can eliminate these issues entirely.

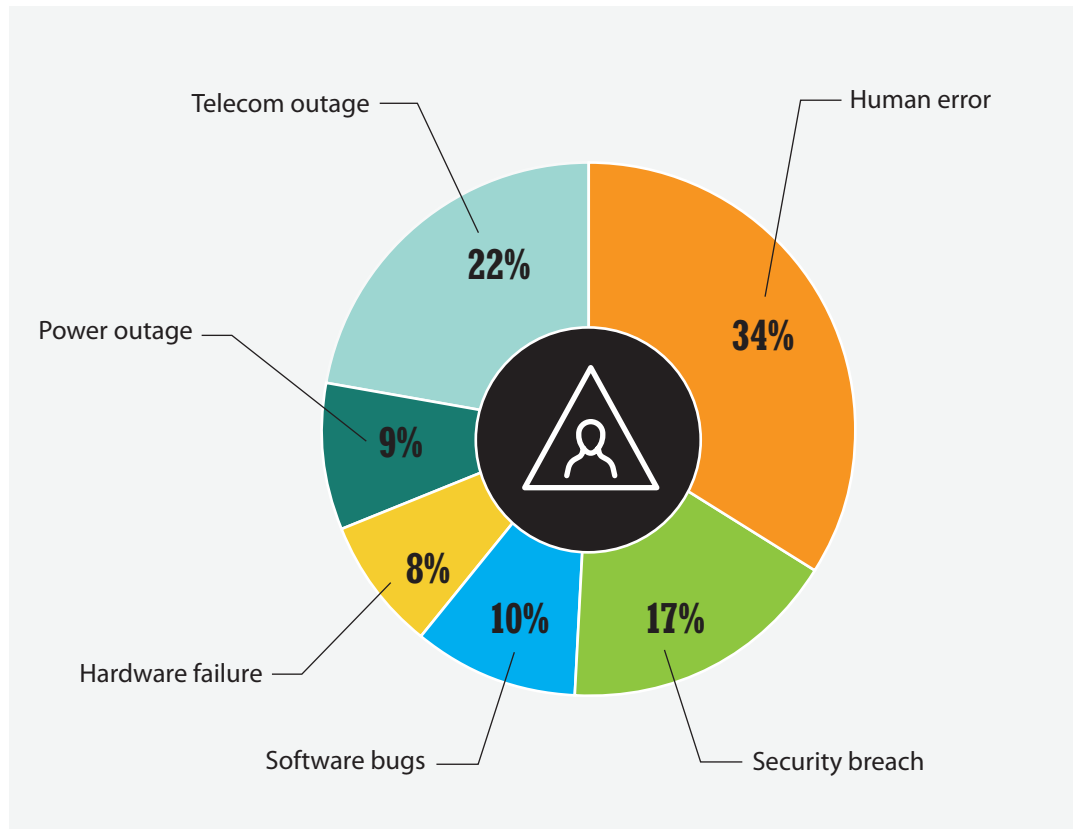
A next-generation SD-WAN can identify patterns, processes and deviations from baselines and offer recommendations to solve many problems that plague network operations, such as the following:

- The network path, based on application performance
- Where and when to dynamically add bandwidth
- The best way to connect home users to cloud resources
- Which applications need priority based on business policies
- The endpoints that should be quarantined based on traffic analysis

It's unlikely that most organizations will shift to a fully autonomous network overnight. In time, though, with enough training data, feedback and positive recommendations, network professionals will realize that next-generation SD-WANs will enable them to spend more time on strategic endeavors and let the network run itself.

A good analogy of this is the impact that AI has had on radiology. Initially, doctors were against having AI inspect MRIs, as the doctors felt they could do it better than machines. Over time, though, doctors have realized AI algorithms can spot things that are almost impossible to see with the human eye. Doctors who have embraced AI can spend more time treating patients and less time evaluating MRIs.

Similarly, with network operations, next-generation SD-WANs will continue to get smarter as companies feed them more training data. Rather than the enemy, they should be considered the engineer's best friend.

Exhibit 4: Human Error Plagues Network Operations

ZK Research 2019 Network Purchase Intention Study

Cloud-Delivered Branch Services

The next-generation SD-WAN should provide a service edge to the cloud that ensures simplified management and operations. This should be comprehensive, with a security-as-a-service layer that applies best-in-class security to everything that traverses the network, including software-as-a-service (SaaS) services, public cloud assets, internet resources and data center intelligence back at headquarters.

The security layer should include Secure Sockets Layer (SSL) decryption, cloud access security broker (CASB), zero-trust network access (ZTNA), cloud secure web gateway (SWG), sandboxing, data loss prevention (DLP), Domain Name System (DNS) and firewall as a service (FWaaS). Moreover, it should connect directly to the network layer, including the next-generation SD-WAN, along with IPsec and SSL virtual private network (SSL VPN), policy-based forwarding, quality of service (QoS) and network as a service. All of this should bring together employees who work in branches, those who are working at home and those who connect via their mobile device.

Using this approach, the next-generation SD-WAN will provide companies with infinite scale and performance. Plus, it will reduce total cost of ownership while improving return on investment

The next-generation SD-WAN will provide companies with infinite scale and performance.

because companies won't have to deploy hardware in all branches, which can be a drain on opex as well as capex. The amount of money saved will vary by the type of company, the age of hardware, the number of locations, how many locations are global and other factors, but all businesses should expect SD-WANs to result in significant savings. After conducting dozens of interviews with organizations that have shifted to SD-WANs, ZK Research estimates the average savings to be in the 40% range but has seen some examples closer to 90%.

Benefits to the Business

CIOs, heads of infrastructure, network architects and network engineers have shared interests in getting the next-generation SD-WAN up and running. The following list encompasses the needs and concerns for all of these people:

Finite resources: To justify an investment, the SD-WAN must have measurable value and must show a path to reduce WAN costs.

The right skills: Both vendors and internal teams need to have the right skills to support their transformation.

Cloud ready: A next-gen SD-WAN should be cloud ready, with no soon-to-be-obsolete hardware to enable digital solutions.

Innovation enabling: An SD-WAN should enable staff to spend time innovating rather than performing maintenance and just keeping things running, which are the day-to-day realities of their current operations.

Office, road or home—same access and connectivity: The workforce demands the same application access and network connectivity no matter where they are. The next-gen SD-WAN must have the ability to flexibly configure the network and ramp up or down support in line with end-user demand.

Simple management: To prevent downtime, the SD-WAN should have tools to help identify issues before they become an outage. Plus, because an SD-WAN can also monitor the security of the environment, companies don't need to install, manage and monitor complex point products.

These are a few of the issues facing today's network professionals. A modern SD-WAN will remove many more concerns, as illustrated in the next section, which focuses on Palo Alto Networks' introduction of the next-generation SD-WAN.

SECTION IV: PALO ALTO NETWORKS INTRODUCES NEXT-GENERATION SD-WANS

Late last year, [Palo Alto Networks announced its next-generation SD-WAN solution](#) that addresses the issues with traditional legacy SD-WANs. This solution is built on a combination of Palo Alto Networks' technology and CloudGenix, which it acquired in 2020. The integrated solution is Prisma SD-WAN.

The SD-WAN solution from Palo Alto Networks measures up to the criteria listed in the previous section as follows:

Application-Defined Networking

This is a significant shift in the role of the network, because the SD-WAN makes changes based on application-level events. Traditional networks look at network-level events such as packet loss and jitter to determine how and where to route traffic. There is an effect on apps, but it's not always a correct interpretation. Palo Alto Networks monitors application sessions and makes decisions based on transaction times, application fingerprints, mean opinion scores (MOSs) and more. The network essentially becomes an "application fabric" that can continually optimize traffic flows on an app-by-app basis.

To get an idea of the impact this can have, consider that AutoNation deployed Prisma SD-WAN and saw a substantial reduction in opex costs with zero downtime. In fact, a store closed one evening using the legacy WAN and opened the following morning using Prisma SD-WAN—all with zero downtime. Prisma Instant-On Network (ION) appliances provide services from the cloud so there's no need for additional on-site support. Plus, ML-based analytics along with Layer 7 visibility for troubleshooting mean significantly lower opex.

Autonomous Network Operations

Palo Alto Networks uses ML to automate network operations and troubleshooting. The company captures network data and analyzes it to understand baseline operations. It sees any changes immediately and, if needed, enables the network to adjust automatically. Companies can create application, security and compliance policies that can be enforced via automation, removing any chance of human error.

With this release, Palo Alto Networks introduced several new capabilities, including automated problem resolution, statistical analysis of application performance and event correlation. As business-critical applications, including core customer relationship management (CRM) software and email, shifted to the cloud, one customer, CAPTRUST, implemented the Prisma SD-WAN automation capabilities. The direct-to-internet connections reshaped traffic flows, which reduced the inevitable bottlenecks of a hub-and-spoke MPLS network. As a result, CAPTRUST has seen a 90% reduction in outages and a four-fold increase in bandwidth with no additional spending.

Cloud-Delivered Branch Services

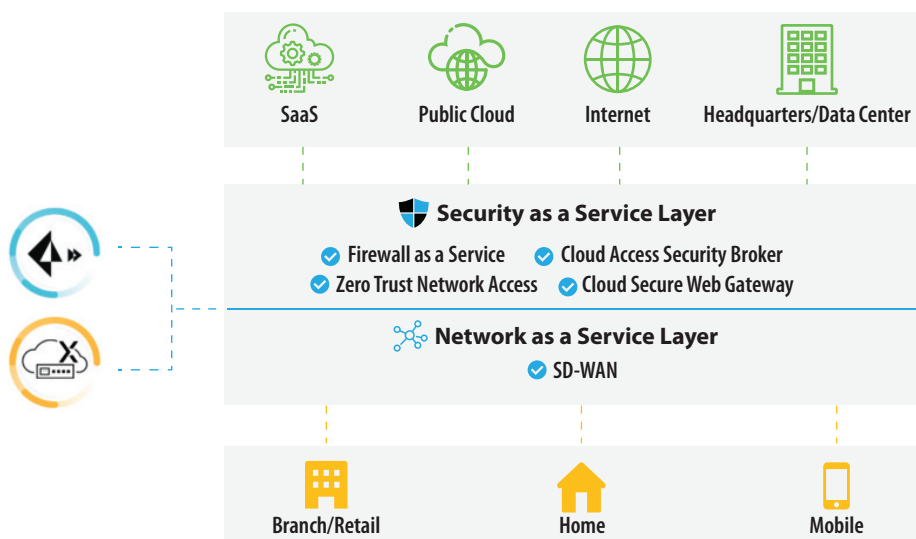
With legacy environments, companies deployed network and security services in branches on physical hardware. This meant an engineer had to log in to each of those devices and perform the same task over and over. Palo Alto Networks has made all network and security services available from the cloud (Exhibit 5), such as QoS, VPNs, policy-based forwarding, firewalls, zero trust and sandboxing. Consequently, each branch can have the same level of data center–class security without requiring physical infrastructure, which reduces costs and increases ROI. Customers could also use this to scale working from home. Users connecting from their house or even from a mobile device in a coffee shop would connect into the cloud and be protected by the cloud-resident security services. Cloud-delivered services are the only way to cost effectively scale WANs, as the WAN is now connecting branches, home workers, clouds, edges and IoT endpoints.

SECTION V: CONCLUSION AND RECOMMENDATIONS

Digital transformation and the COVID-19 pandemic have reshaped the business world. As a result, companies have had to rapidly deploy cloud services, mobile initiatives, IoT projects and other programs. This puts an emphasis on the WAN to evolve to meet the needs of a digital organization. SD-WANs can enable this change, but businesses must select their SD-WAN partner carefully. Many legacy SD-WAN solutions enable companies to move away from MPLS to lower

Exhibit 5: Palo Alto Networks Has a Robust Set of Cloud-Delivered Network and Security Services

Prisma Access and Prisma SD-WAN: The Industry’s Most Comprehensive SASE



Palo Alto Networks and ZK Research, 2021

cost broadband, but there is so much more to an SD-WAN than just lowering the cost of the transport. Businesses should look for a next-generation SD-WAN solution that delivers a rich set of security and network services from the cloud.

ZK Research recommends that companies considering an SD-WAN seek out a solution that delivers the following:

Application-defined networking: COVID-19 has reshaped the world, and networks have been forced to respond. Next-generation SD-WANs should work the way people and businesses work, not the other way around.

Autonomous, error-free operations: Next-generation SD-WANs should take advantage of AI, ML, network data and business policies to enable a fully autonomous network—without the need for human intervention. This will eliminate the people-driven, labor-intensive heavy lifting required to run a network.

Cloud-delivered services: The next-generation SD-WAN should provide infinite scale and performance. It should have a service edge to the cloud that ensures simplified management and operations—and has security and network layers that cover all the protocols and enable employees to work from anywhere.

Fewer headaches: An SD-WAN should consider the shared interests of CIOs, heads of infrastructure, network architects and network engineers by being efficient, cloud ready, innovation enabling and simple to manage.

These network-centric paradigms have shifted the network—particularly the WAN—from being the “pipes” of an organization to its most important strategic asset. As a result, the network needs to evolve, but SD-WANs alone don’t solve all problems. Palo Alto Networks’ new next-generation SD-WAN shifts the focus of SD-WANs from being transport centric to being security and application centric.

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