2019 eBook

How to Scale with SD-WAN

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About this eBook

SD-WAN technology is growing in popularity as a way to connect enterprises, branch offices, and data centers over large geographic distances. The advantage of SD-WAN is that it uses software to move the network control to the cloud rather than relying on proprietary hardware. It can also be quickly deployed – quicker than an MPLS link that has to be provisioned and requires a lengthy contract.

But deploying SD-WAN at scale can make even the most IT-savvy enterprise a bit anxious. How can companies scale their SD-WAN and maintain a consistent deployment? This eBrief looks at some of the challenges associated with deploying SD-WAN at scale. It also looks at some of the use cases driving SD-WAN at scale deployments. Finally, SDxCentral spoke with real-world enterprises about their large SD-WAN deployments and how it affects the economics of providing internet connectivity.

About the Sponsor

Juniper Networks is leading the revolution in networking, making it one of the most exciting technology companies in Silicon Valley today. Since being founded by Pradeep Sindhu, Dennis Ferguson, and Bjorn Liencres nearly 20 years ago, Juniper's sole mission has been to create innovative products and solutions that meet the growing demands of the connected world.

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Security: Vital for SD-WAN at Any Scale

By Carl Weinschenk

In simpler times, legacy wide-area networks excelled. They were — and still are, since the transition to software-defined wide-area networks (SD-WAN) is by no means complete — highly reliable and secure. Those two attributes were enough to win a place in the hearts, minds, and budgets of networking personnel and the C-level executives to whom they report.

Now, networks have grown vastly more complex and no longer mesh with legacy approaches. "As enterprises migrate to the cloud, new network traffic patterns emerge that traditional WAN architectures are not optimized to handle," Chalan Aras, Citrix's vice president for SD-WAN and intelligent traffic management, told SDxCentral. "Potential exposure comes from connecting to multi-cloud environments, SaaS, and to the general internet. Businesses need to consider security for applications, network, and cloud."

If handled poorly, this environment can become a security nightmare. "[SD-WAN] dramatically increases the attack surface, and traditional 'perimeter-based' security measures are not designed to address vulnerabilities that can infect laterally or east to west across the network," Pat McCabe, marketing director for Nokia's Nuage Networks told SDxCentral.

Legacy WANs are secure because they are simple (at least conceptually): All traffic is routed through a secure portal to ensure that policy and security requirements are satisfied. The only potential exposure point is where the secure portal interacts with the internet point of presence.

It's safe, secure — and cumbersome. Communications between a remote location in Maine and a vendor in New Hampshire would require routing through a data center in Phoenix. This is known as the "accordion effect." It is inefficient, uses expensive multiprotocol label switching (MPLS) routing, and adds latency that can stop time-sensitive applications and services from working.

Enter SD-WAN

In an SD-WAN environment, branch offices and other distributed assets don't rely on the secure portal, and add connectivity options including broadband, direct links, LTE, and soon, 5G. There is good news and more good news: The WAN becomes more fluid, flexible, faster, and cheaper.

There is a challenge, however. SD-WANs must achieve the level of security of legacy WANs. Not doing so is a deal breaker, no matter what other advantages the technology brings to the table. No company will sacrifice security, even for these advantages.

And it's not easy. "Now, applications have migrated to the cloud, and users now access applications from anywhere, on any device, and across various connection types, including the internet," Gerard Festa, Zscaler's vice president of product marketing, told SDxCentral. "This has increased the attack surface and emphasizes the need for more advanced security services to protect the branch from threats."

The bottom line is that modern networking requires the flexibility of SD-WANs, and the security of legacy

WANs. The industry clearly is delivering the SD-WAN functionality — indeed, it is systematically increasing it. The question is whether they can do the same on the security side.

The challenge is significant. It's prohibitively expensive to replicate the security suite at every remote asset. Nor is it a cookie-cutter approach: The security policies at remote locations likely differ, depending on size, task, and personnel. A further complication is that remote personnel likely will be reluctant or unable to do what is necessary to keep security systems up to date.

Securing SD-WANs

The overall goal is to ensure compliance and to secure direct internet, cloud and guest access, according to Anand Oswal, senior vice president of engineering for Cisco's Enterprise Networking business. These are, he said, "especially relevant in the branch." The emerging solutions use two strategies, Oswal said. The two can be used simultaneously depending upon the needs at a particular branch or remote facility.

The first puts a layer of cloud-based security between the branch or remote office, other branches or remote offices, the corporate network, the internet, and clouds the organization uses. In short, the remote asset in almost all instances connects to the outside world through the cloud.

Existing routing gear at the branch sends data streams through a secure connection to the security cloud. The streams are assessed. If they are secure and comply with corporate policies, they are sent to their destination. This process is followed in reverse for data intended for the branch office or other type of remote site. The remote locale does not directly "touch" the internet.

The second tool takes advantage of the virtualization capabilities in SD-WAN, which, after all, is a use case of software-defined networking. In this approach, security functionality is downloaded to the equipment at the remote location. In this manner, all elements — unified threat management, intrusion detection, next-generation firewalls, and others — are deployed to the remote locale. This may require equipment at the site to be upgraded.

Taken together, these two approaches are seen as an effective way to replicate the reliable world of legacy WANs without obviating any of the approach's advantages. "SD-WAN provides a robust approach, enabling network managers to centrally define and enforce consistent security policies across the WAN to accelerate application deployments and free IT to focus on more strategic business initiatives," according to Damon Ennis, Silver Peak's senior vice president of products. "Changes can be made once and executed across the network in minutes, not days or weeks."

The good news for SD-WAN proponents is that the industry has recognized that tackling the security challenge is not an option — it is a requirement. SD-WANs have a lot of moving parts. This makes it vital to develop security platforms that are deeply integrated and don't introduce inadvertent cracks through which bad actors can enter. Along the same lines, complexity must be controlled by creating a single "pane of glass" that oversees end-to-end security.

Organizations must take great care in planning and executing the transition to SD-WAN. Steve Veneman, the director of service provider marketing for Metro and Managed Services for Juniper Networks, told SDxCentral that"an SD-WAN solution should come with a fully integrated NGFW solution that supports a vertically integrated solution portfolio extending up through intrusion detection and prevention solutions, comprehensive unified threat management and advanced threat protection. SD-WAN solutions should also provide the ability to integrate other vendors' NGFW VNFs into the solution as well to support existing security environments. Security should be an integral part of an SD-WAN and a next generation, software-defined branch solution. It should never be a bolt-on or after thought to the solution."

SD-WAN Economies Depend on the Level of MPLS Retained

Three enterprises speak: connectivity costs dropped significantly or remained neutral

By Matt Hamblen

Whether costs go up or down or remain neutral, installing and using SD-WAN appliances and management software often represents a wholesale adjustment to a company's economic model for connectivity — and not only at the WAN, according to interviews with industry analysts and network managers at large organizations that have deployed SD-WAN.

The biggest change to an enterprise's traditional economic model is that MPLS costs can go down — sometimes drastically — while broadband and internet costs can go up. A big part of such a cost increase may come from managing the relationships with dozens of internet and broadband providers, or making sure such connections are available and reliable, especially in remote areas.

"I've seen companies spend more on network services with SD-WAN, and I've seen others save up to 90%," said Zeus Kerravala, a former network engineer and current analyst at ZK Research. "The big factor is what they decide to do with MPLS."

A global company with MPLS connections that gets rid of all of its MPLS in favor of broadband "will see huge cost savings," Kerravala added. That would be especially true if the MPLS links were transatlantic or transpacific.

By contrast, a company that keeps MPLS with SD-WAN and then adds broadband to increase agility and improve the performance of its MPLS network will see costs go up. And costs can go "way up" if a company chooses a metered broadband service over 3G or 4G, Kerravala added.

Also, operational costs can go up or down, depending on network configuration and the level of automation. A big unknown is how much management of broadband service providers is required, and how much that management costs. Case in point: in the U.S., there's no nationwide broadband provider, and almost 900 different regional ISPs. "It's possible that by switching to SD-WAN, a U.S. business would need to cut contracts with 10, 20, 30 or more broadband providers," Kerravala added.

At three different large organizations using SD-WAN, IT practitioners said in interviews that overall connectivity costs were reduced or held neutral, yet the economic model changed significantly as MPLS usage dropped and broadband usage increased. The benefits in all three cases were greater levels of network agility and performance, as well as innovations using applications in the cloud, and SaaS that couldn't have been done with a legacy network. Often, companies are willing to spend more on network services and technologies to achieve such breakthroughs.

National Instruments

At National Instruments (NI) in Austin, Texas, SD-WAN hardware and software have been deployed to 68% of its 88 global sites at a cost of $180,000. MPLS reliance has dropped, with spending down by half: from $1.5 million in 2017 to a projected estimate of $700,000 for all of 2019.

However, NI has needed to work with dozens of ISPs globally to make sure they are charging properly and adjusting downward for when NI turns down its internet needs based on SD-WAN management. "If we implement SD-WAN in Central America and I have two 20 Mbps circuits for $16,000 a month and I only really need 6 Mpbs, then I should realize those savings," said Luis Castillo, senior manager for global network engineering at NI.

Castillo has found it sometimes takes two to three billing cycles for an ISP to reflect such reductions on an invoice, which should instead be nearly automatic. “The main issue is that the ISP market is very slow-moving,” he added.

At NI, Castillo has resorted to hiring a broker to find the least expensive broadband service in each of dozens of countries where NI operates. He hopes to eventually reduce about 40 ISPs currently being used down to 10. Also, as packet duplication technology matures in the next five to seven years, NI could also minimize or completely remove the need for MPLS.

Even with the need for greater oversight of ISPs and the added cost of internet circuit upgrades, overall connectivity costs have gone down “significantly” at NI, Castillo said. “Internet circuit costs have gone up, but we use a fraction of the savings from MPLS to fund both the internet circuit upgrades and the SD-WAN investment itself,” he said.

First Bank

At First Bank in St. Louis, SD-WAN has resulted in ending MPLS connections to 94 bank branches and dozens of ATMs and migrating to low-cost internet services. About 95% of the bank’s many internet connections are managed by a single carrier, with total savings of $1 million per year and faster application performance.

“We’ve ended up saving a ton of money,” said Marc Ashworth, chief information security officer at First Bank. Using SD-WAN with wireline internet connections has served as a reminder that a network “is only as stable as the copper or the fiber in a building,” he added. 5G wireless connections will be important in the future, especially because while internet circuits might be available over fiber in a big city, they are not always economical.

A bonus with SD-WAN is that First Bank can make a quick configuration change when needed. “If maybe you’re not satisfied with a provider, you’re not tied in,” Ashworth said.

University of Pennsylvania Medical Center

At the University of Pennsylvania Medical Center, a large SD-WAN implementation connects remote radiologists and other doctors to clinics. With 40 hospitals and 700 remote offices, and plenty more growth on the way, UPMC started with a dozen SD-WAN sites in 2017, with more than 50 sites today. UPMC expects to support 800 sites on SD-WAN in two years.

The main achievement with SD-WAN has been to increase network performance for big data with a host of medical applications — everything from 2 TB genomic sequences to digital images. “So far, SD-WAN hasn’t changed the economics,” said Dan Snyder, principal architect at UPMC. “We have improved performance in some cases, but it has been cost neutral. This is also dependent on what type of connectivity is available in a geographic area,” he said.

The economics of SD-WAN have undoubtedly impacted processes at service providers who generally don’t discuss how they are adapting to anticipated lower MPLS revenues. Instead, they tend to focus on how their enterprise customers can save on SD-WAN.

For example, SD-WAN can improve the total cost of ownership for a business by supporting the same number of network functions, or more, and with less hardware. “Routing applications through the transport that’s most efficient for an application’s need can drive down costs for a business,” added Rupesh Chokshi, assistant vice president of product marketing management at AT&T Business.

Overall, SD-WAN can lower total costs, but it’s also clear that the technology requires a comprehensive analysis into ways it might help a company grow with greater capabilities and agility.

Scaling SD-WAN Across the Chasm and Into the Mainstream Market

By Juniper Networks

The SD-WAN market is hot. In their recent report, IDC projects that the SD-WAN market will grow at a 40.4% CAGR and arrive at $4.5B in revenue in 2022. More than a few vendors have jumped into the pool, introducing their version of SD-WAN solutions to the market, with new vendors still appearing. The capabilities of these various SD-WAN solutions range from basic to complex; some simply offer automated branch provisioning, some the next version of their firewall product and others a next generation of WAN acceleration, while others offer AppQoE, integrated security, APIs for customization and full redundancy.

Yet the SD-WAN market has recently arrived at a key turning point in its product adoption life cycle, the infamous hairpin-turn of product maturation and market acceptance also known as the chasm. This is the turn where the market transitions from early adopters kicking the tires to deployment at scale.

Which brings us to the question that everyone seems to be asking - can SD-WAN scale cost effectively enough to support broad market adoption or will it become yet another promising technology that produced lots of hype but little substance?

Can SD-WAN scale cost effectively enough to support broad market adoption or will it become yet another promising technology that produced lots of hype but little substance?

At Juniper Networks, we believe that SD-WAN is unquestionably ready for cost effective deployment at scale today. However, we also recognize that there isn't a single parameter to consider when answering the question whether SD-WAN can scale to support broad market adoption. Multiple parameters need to be considered: number of endpoints, multi-tenancy, redundancy, endpoint capacity, hub/gateway performance and, perhaps most importantly, can SD-WAN grow beyond a WAN centric only solution?

Endpoint Scale: As larger enterprises look to adopt SD-WAN there is a need for SD-WAN solutions to support 1,000s to 10,000s of endpoints with a single controller cluster, see recent EANTC SD-WAN validation report.

Multi-tenancy: Multi-tenancy is important for service provider managed deployment efficiency and large globally distributed enterprises with multiple business entities; such that multiple customers or organizations can securely use the same SD-WAN controller infrastructure cost effectively. Service providers, specifically, will also require the ability to set up tenants within their own organization as a means of creating a management hierarchy across regions or teams within the SD-WAN platform. And enterprise organizations will benefit from role-based access control (RBAC) as well, so that they can provide secure access to specific sub

networks or LANs along with network and application performance metrics to specific teams or sub-groups within the organization.

Redundancy: While we shouldn't have to talk about redundancy, not all SD-WAN solutions are fully redundant and highly available. Redundancy should be offered for all components and aspects of the solution: redundant and clustered controllers, redundant hubs and gateways, WAN access links and CPE device clustering should all be provided.

CPE capacity: For mid-to-large size enterprise deployment, CPE devices that provide hardware acceleration will be required to support IPSec tunneling at scale across 1Gbps and 10Gbps access links. However, solution providers must offer cost-effective solutions that can scale from 10Mbps services through 10Gbps services across multiple WAN access network types such as LTE, satellite, ADSL/VDSL and of course native Ethernet. Better solutions also provide software and virtual endpoints, as well as physical, hardware endpoints.

Hubs and Gateways: SD-WAN solutions should be able to leverage existing network infrastructure for hub and gateway devices. This minimizes the need for additional spend on built-for-purpose SD-WAN hardware that is required to support the broader SD-WAN solution. Additionally, these hubs/gateways should provide hardware acceleration support, multi-tenancy for customer traffic, enabling them to provide 256bit AES IPSec encrypted performance at scale.

Third Party VNFs: While this is a requirement for integrating third-party security solutions into the SD-WAN environment today, as market adoption continues, there will be a growing need for SD-WAN solutions to support additional VNFs, some of which may be custom applications provided by the enterprise or service provider.

Beyond SD-WAN: SD-WAN solutions need to be open and flexible enough to support the integration of additional services beyond SD-WAN, such as security, Wi-Fi and LAN management at the branch.

"Juniper Networks Contrail SD-WAN was designed to meet the scalability requirements of the most demanding global network service providers and mission critical global enterprise networks," said Sally Bament, Vice President, Service Provider Marketing at Juniper Networks. "In doing so, we have built a secure, open, and extensible platform that scales to meet the most demanding network requirements while simplifying and automating the delivery of a complete portfolio of enterprise network services that includes managed SD-WAN, security, LAN, and Wi-Fi."

The transition to multicloud is happening now and organizations are consuming applications and services predominantly through the cloud to benefit from the flexibility, agility and cost savings that the cloud provides. However, if service providers want to participate in the transition to the cloud and remain relevant players in the cloud business model as more and more content and applications transition to the cloud, they will require SD-WAN solutions that enable them to securely and cost effectively scale to extend this same flexibility, agility and economic benefit to their WAN and potentially LAN service offerings.

At Juniper Networks, we envision that the future of SD-WAN rests on its ability to help enterprise organizations simplify their network today, enabling them to successfully make the transition to multi-cloud, while providing the flexibility and agility to evolve to where their business will need to be tomorrow and into the future.

Yes, SD-WAN will make the turn to broad market adoption, and we at Juniper Networks are committed to providing a secure SD-WAN platform that will efficiently scale to meet the needs of the smallest and the largest, most demanding, mission critical enterprise networks.

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SD-WAN's Flexibility Positions it for Multi-Cloud Deployments

By Carl Weinschenk

Modern IT and telecommunications companies are lucky. After all, a steady stream of new technologies and techniques have emerged that enable them to introduce exciting services and do their jobs more efficiently and less expensively.

These advances are dragging the network along with them. The explosion means that the old approach to enterprise networking that focused on a static corporate data center is antiquated. Legacy WANs, which still represent the lion's share of WAN architectures, are increasingly a gating factor working against a company's success.

Clouds and SaaS are front and center in this changing world. The doors to the data center are open. "This transition includes an emphasis on the cloud to simplify, automate, and scale [businesses'] tools and processes, increase productivity, and expand their business into new markets and regions," Steven Veneman, Juniper Networks' director of service provider marketing for metro and managed services, told SDxCentral. "As a result, enterprises are moving to multi-cloud environments, which have increased the number of cloud endpoint locations that their end users will need to access, which has dramatically changed the enterprise WAN architecture. The corporate hub model is going away."

This is a major reworking. Suddenly, enterprises need insight into networking elements they don't directly control. Stored data, applications, microservices, and other necessary elements are spread over a broad landscape. The potential is great — as are the challenges.

"As enterprises embrace multi-clouds to complement their existing private compute resources, they effectively extend their data center boundaries," wrote Pat McCabe, marketing director for Nokia's Nuage Networks. "This introduces performance and security issues, as applications can be served by workloads outside of their controlled boundaries. WANs now need to have application-level visibility and control to ensure performance of each application."

Managing New Complexity with SD-WAN

It's a complex world. Increasingly, the networking industry is putting its money on software-defined wide-area networks (SD-WANs). SD-WANs initially emerged as a way to make things work more efficiently and less expensively. The concept has evolved to tightly couple the enterprise to the cloud and work on the assumption that very tight integration of technology, management and security are keys to success.

"SD-WAN extends networks to the cloud by allowing a virtual appliance to be operated within multi-cloud environments such as AWS, Azure, or Google Cloud Platform," according to Chalan Aras, vice president of SD-WAN and intelligent traffic management for Citrix. "In doing so, businesses benefit from the reliability of utilizing multiple and often cost-effective links such as DSL, Cable, 4G/LTE, or satellite to connect their branches and data centers to the cloud."

Legacy WAN architectures are characterized by

two things: centralized security and reliance upon multiprotocol label switching (MPLS) for transport. These both are problematic in today's landscape. Centralized security means that data coming from or going to the internet must be routed through that point. This is inefficient and introduces latency that can degrade or crash real-time applications. The problem with MPLS is even more obvious: It is expensive.

This new world can't function without networking flexibility. "SD-WAN is an essential ingredient in re-architecting the wide area network for multi-cloud deployments," according to Damon Ennis, Silver Peak's senior vice president of products. "With many enterprises having already moved 60 to 70 percent of their applications to the cloud, deploying an SD-WAN enables them to securely and directly connect users to applications wherever they reside by the most efficient route."

The bottom line is that modern use of multiple clouds and older WAN architectures are in conflict. In a multiple cloud environment, applications and data reside in many different places. Legacy WAN architectures were designed in an earlier day in which these assets were centralized. Using old technology to support new requirements makes things cumbersome, expensive, and in some cases impossible.

Multiple Connectivity Options

SD-WANs are well-positioned to supplant centralized and expensive WANs because flexibility is a design principle, not something that designers try to add on after the technology is deployed. There is no central point through which all data must flow. And, instead of being restricted to MPLS, SD-WANs offer right-size capacity, availability, and other elements across all options. Cloud-based resources can be reached with the least-expensive appropriate connectivity option. They also can link assets between clouds on behalf of the enterprise, and create meshes that provide disaster recovery and business continuity platforms.

"One of the key features of SD-WAN is the ability to use multiple connectivity options simultaneously to always have the most reliable or appropriate connection for application Quality of Experience from multiple clouds," wrote Anand Oswal, senior vice president of engineering for Cisco's Enterprise Networking business. "Organizations can choose among the options available for each branch location: MPLS, Ethernet, internet, leased lines, DSL, LTE networks, and soon 5G."

SD-WANs and multi-cloud fit together nicely. GlobalData Research Director Mike Fratto told SDxCentral that an SD-WAN is not a prerequisite to running a multi-cloud environment. But, he wrote, it is very helpful. "[W]ith SD-WAN deployed on cloud instances, applications hosted in cloud services can be brought into the same access topology as branches and other locations which provide a consistent management system," he wrote. "Enterprise IT can also use SD-WAN for intercloud connectivity, also for the same reasons and benefits."

The main takeaway is that SD-WAN is an inherently better way of handling multi-cloud environments than legacy WANs — but that the category is not fully mature yet. The next step is to build in the management and monitoring capabilities that are necessary to enable optimal performance and the fulfillment of service level agreements and other proof of performance.

Management tools are not fully baked into SD-WAN platforms, experts say. Cisco's Oswal cautions organizations to be careful about vendors that don't offer a comprehensive software stack. Adding elements from third party vendors, he told SDxCentral, can lead to integration problems if not done correctly.

Top SD-WAN Use Cases for Enterprises

Large enterprises turn to SD-WAN to solve several widely recognized networking problems.

By Matt Hamblen

Analysts and major vendors identify at least four reasons enterprises choose SD-WAN: to create a hybrid WAN; for local internet breakout to the cloud or SaaS; for application visibility and intelligent routing; and for fast provisioning of branch offices.

Obviously, some enterprises want SD-WAN for multiple reasons, while some start out just wanting to replace aging routers.

More than 40 different vendors now sell SD-WAN appliances and management and control software to thousands of customers globally, following along the lines of these use cases.

IHS Markit calculated global revenues for SD-WAN at $360 million in the fourth quarter of 2018, more than double for the same period a year earlier.

As an indication of the strong growth expected in coming years, IHS Markit recently forecasted SD-WAN vendor revenues for SD-WAN appliances and control and management software to top $4 billion in 2023.

In an IHS Markit survey, businesses cited several reasons for deploying or wanting to convert to SD-WAN. The biggest driver was a desire to improve application performance, followed closely by the need to simplify WAN provisioning and to improve WAN utilization. Other top drivers included the desire for a self-service WAN management portal, and rapid-site WAN provisioning.

Hybrid WAN

The use of SD-WAN to create a hybrid WAN describes the ability to move traffic through both MPLS and internet, instead of relying only on MPLS.

“It’s a very popular and important use case and for all types of companies,” said Ray Mota, principal analyst at ACG Research.

The main benefit is to lower the cost of connectivity. For example, an internet-based financial publishing company might connect its New York headquarters to its branches with redundant MPLS, using different MPLS providers for the two connections. The hybrid solution would keep a single MPLS pipe with a single provider, with the backup link going to an internet provider — possibly a cable provider that would charge far less for internet than what MPLS would have cost.

Mota warned that some vendors describe creating hybrid WAN as a simple process, but added, “It’s not as simple as it sounds because the enterprise might not have the resources or the staff to make the conversion.” As a result, hybrid WAN creates “a major opportunity for a service provider to jump in” and offer conversion services.

Application Visibility and Intelligent Routing

SD-WAN allows a company to learn in real time about apps and latencies across an entire network. Several vendors advertise a central pane of glass to attain this visibility. With intelligent routing, for example, IT

managers can keep voice and video apps in MPLS, while pushing email over broadband, and routing apps like Facebook or YouTube onto cheaper 4G wireless internet.

A company can also create application policies for routing across domains. Such work could be done before SD-WAN, but was considered very complex. A company also has the ability to pair specific apps to specific SLA levels.

This use case is not as popular as hybrid WAN, and is often a service provider offering. In a co-managed set-up, an enterprise will keep all the WAN visibility and change control. Analysts warn that a business could face a challenge if they give too much control to a service provider.

Internet Break-Out to Cloud or SaaS

For a large organization with dozens or even hundreds of branches, SD-WAN can lower network latency by allowing branch users to access cloud-based apps directly at the network edge via the internet, instead of app requests being backhauled via MPLS to the data center before hitting the cloud.

SD-WAN allows IT managers to know which branch offices can connect directly through the internet to connect to, say, AWS with SaleForce and Box without facing unnecessary latency.

Sometimes the most efficient, low-latency route might still go back through the data center, based on the SD-WAN's intelligence, according to some experts. The biggest challenge in implementing an internet break-out could be finding suitable low-cost ISPs to carry the traffic.

Fast Provisioning of Branch Offices

One use case that is starting to gain popularity, according to Mota, is using SD-WAN to quickly bring up WAN services to branch offices. Sometimes a retailer might want a pop-up shop that could need a quick connection that lasts only temporarily — during the busy holidays, for instance.

"I can bring up a branch office with LTE overnight using SD-WAN," Mota said. "With SD-WAN, management control and policies don't have be over wireline."

By comparison, it might take months to provision Ethernet or MPLS at a branch office. With some businesses, a branch office could be very small and might not bring in enough revenue to stay open long-term. Or, if the branch proves successful, an LTE link could be converted to MPLS when it is finally provisioned, keeping the LTE as a backhaul link.

Such a use case makes the most sense for retailers or energy providers that operate in places where it is difficult to reach a wireline provider. One initial challenge will be finding a wireless provider to serve the branch. As 5G wireless spreads, the task might be easier.

Router Replacement

SD-WAN appliances can be used to replace aging routers, which might be all that some IT managers are hoping to achieve, at least initially.

At First Bank, based in St. Louis, the company has installed an SD-WAN edge platform to reach 94 branches. It has seen a $1 million annual savings by migrating from MPLS to internet.

"Our plan initially was to update routers, but this spring we have deployed SD-WAN to one of two data centers for synchronization and secondary connectivity," said Marc Ashworth, chief information security officer for First Bank.

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