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Getting to the WAN You Need

Adopt SD-WAN for a Better, Faster, More Affordable
Business-Critical WAN

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Executive Summary

SD-WAN is reshaping wide area networking by radically improving visibility and control via simplifying WAN management while improving WAN reliability, performance, and economics. It combines the use of multiple active branch links, intelligent direction of traffic across those links, and centralized, policy-driven management of the WAN as a whole. The ability to leverage multiple lower-cost services (including Internet and 4G wireless) as well as WAN stalwarts MPLS and Carrier Ethernet transforms IT's relationship to the WAN and the WAN's relationship to the business.

The message is clear: now is the time to take a close look at your company strategy, the IT strategies meant to help drive the company forward, and at budgets and the WAN architecture. Does your organization need more reliable WAN services? More agile ones? Does it need higher bandwidth, lower rates, increased visibility, greater control, more reliability, reduced operating costs? SD-WAN may be the best way to power the changes needed.

IT now must build a compelling business case for making the transition, or risk wasting more staff time and company money on the status quo. The base of the case must be cost: SD-WAN can stop the ballooning growth in WAN costs typical in an MPLS-based enterprise WAN by harnessing Internet connectivity and cutting WAN service bills while delivering substantial improvements in performance and availability. It can also dramatically reduce the amount of staff time required to manage the WAN; particularly the time needed to bring a new site or service online. It can reduce both branch outages and application performance problems. It can position the network as a strategic enabler of transformative efforts and IT as a key strategic contributor.

IT should model the cost of growing with the current architecture to meet future needs and compare that against do-it-yourself and managed SD-WAN options. Then, pursue the course that makes the most sense. If the best choice is SD-WAN, look for solutions and providers that can help with planning and executing the transition

Enterprises are Transforming Themselves...Can the WAN Keep Up?

Digital Transformation (DT) initiatives harness technology to create or improve a product, service, or experience and drive business value by raising revenues, decreasing costs, improving customer loyalty, or creating competitive advantage.

Many DT efforts hinge on providing new and exciting services across the WAN and the Internet. For example, new collaboration tools for staff transform internal work processes; digital signage in stores transforms customer loyalty programs and product price management. As we can see in Figure 1, more than 50% of organizations had implemented, were deploying, or were planning DT initiatives that depend intensely on the enterprise WAN, such as the addition of sensors to products and new collaboration tools.

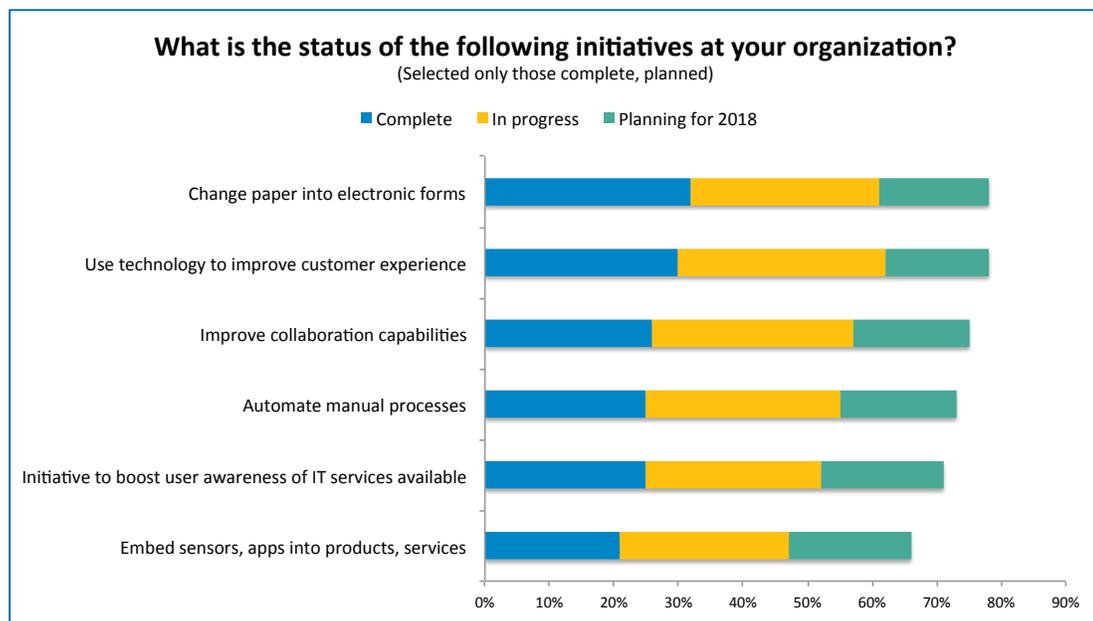


Figure 1: DT Initiatives Lean Heavily on the Network

Other DT efforts hinge on a new approach to branch offices: lean and agile branching, bringing the physical edge of the organization closer to the people it serves so it can do so more flexibly and responsively. Agile branching depends on being able to spin up branches faster, and less expensively, to quickly adapt the physical edge of the enterprise to changing customer demands. Lean branching depends on staff and customers in remote branches interacting in real time with centralized, specialist staff using collaborative technologies. Lean branches may employ kiosk-based conferencing or telepresence now, and someday will embrace virtual reality and remote-controlled “presence bots,” and depends completely on a high-performing network.

One key factor in successful transformations: they are typically quick, with a typical project going from concept to production in just a few months.

Need for Fast Transformation, Meet Network That's Slow to Change

Creating a dynamic WAN for rapid business evolution is key to enabling ongoing transformational efforts. DT projects requiring the WAN need it to be ultrareliable and high-performing. IT needs visibility and fine-grain control to make that possible. And it has to be affordable – or at least more so than the traditional MPLS network.

And yet, for most companies, the WAN is one of the hardest-to-change parts of the infrastructure, and one of the most opaque. WANs are resistant to change for both technological and organizational reasons, and partly by design! After all, the legacy WAN is built around routers and communications links that stay in place for many years and that are typically managed manually and individually—prize roses, each tended with attention to its unique nature. Making changes is a hands-on chore for a network engineer, touching each router or link to reconfigure it; rolling changes back is the same. This makes IT reluctant to make changes lightly, unable to make them quickly, and unhappy to roll them back once deployed.

Another reason WANs are slow to change is that it can take a long time to get a link provisioned. Nemertes research found that more than 40% of organizations have difficulty getting a provider to commit to turning up a new MPLS link in less than a month in North America. The average promised delivery time for an MPLS link is more than a month, and nearly 30% are promised in two months or more. And, unfortunately, MPLS providers have only an 86% on-time percentage for delivering the links, and when missing their mark are on average more than six days late.

In an age of digital transformation, then, the legacy WAN is a challenge and an obstacle. The enterprise needs a new approach in order to get the WAN it wants for the future.

SD-WAN is Reshaping Wide Area Networking

Software Defined WAN (SD-WAN) is the WAN for digital transformation. It radically improves WAN reliability, visibility, and control while shifting the focus off each individual router and link. By pushing a lot of operational detail down out of sight, automating management of all the actual endpoints in the WAN in accordance with centrally defined policies, SD-WAN allows IT to control the WAN as a whole instead of a loose collection of parts. This shift in perspective not only simplifies management, but also drives better WAN reliability and security, enables business-relevant application-centered SLAs, and up-ends traditional WAN economics.

More than 40% of organizations participating in Nemertes Research's [WAN Economics and SD-WAN: 2018-19 Research Study](#) have begun to deploy the technology despite its relative novelty, it having only become a well-defined solution set in the last three years. (Please see Figure 2.) Most will complete their rollouts by 2021. Indeed, its spread is so rapid, and the infusion of SD-WAN functionality into WAN solutions so broad, that soon the cluster of functions we currently call SD-WAN will be considered table stakes—the default expectation for any branch network.

A Better WAN: Resilience, Reliability, Security, Intelligence

SD-WAN elevates the WAN in many ways based on two fundamental shifts: multi-layered virtualization and management via application-aware policy.

Virtual from Bottom to Top

An SD-WAN solution begins virtualizing at the physical layer, with the WAN links feeding a branch. It can pool together and use simultaneously all the connectivity available across all

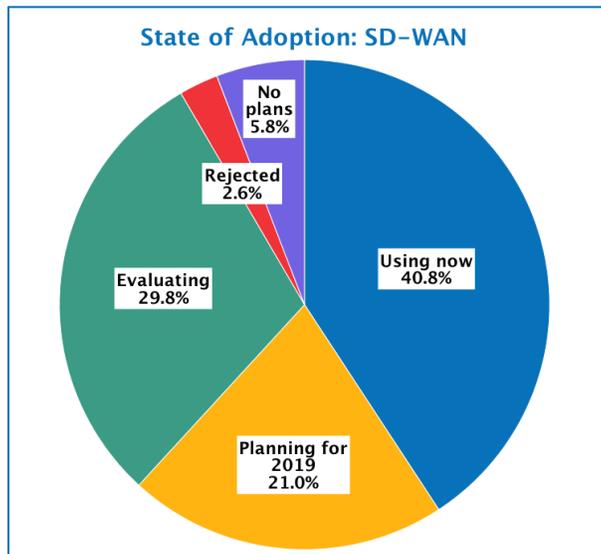


Figure 2: SD-WAN Deployment Begun in 40% of WANs

branch links. In contrast to the typical legacy approach of having a primary and a backup link (which means there is always bandwidth paid for but not used) an SD-WAN expects to use all available connectivity, all the time. It then virtualizes that pooled connectivity, allowing it to be allocated to different applications and groups of applications without direct concern for the details of the underlying links.

The SD-WAN also continuously monitors the health and performance of the links. When one path fails or its performance begins to degrade (e.g. to display

increases in latency or loss) the SD-WAN redirects packets onto other paths instead. Many solutions can provide sub-millisecond failover, allowing seamless delivery of service. And, since link use is controlled by policy, expensive links like 4G or satellite can be held in reserve for use *only* when demand exceeds capacity on other paths, or when other paths experience outages.

The virtualization of the physical layer supports virtualization at the service layer. SD-WAN solutions allow the creation of multiple, overlapping virtual WANs, each serving a different set of needs. A full-mesh WAN for VOIP traffic can touch all the same sites as a hub-and-spoke WAN for DLP-monitored external messaging traffic, though the traffic is completely segregated.

A Higher-Level Perspective: Applications, SLAs, Performance Enhancements

To define the various virtual WANs overlaid on the physical connectivity, SD-WAN solutions provide a central policy engine. Policies establish classes of network traffic based foremost on what kind of traffic it is—what application or applications generate it, and what kind of performance it needs to deliver acceptable service. They can assign available bandwidth to a traffic class (e.g. via minimums, or maximums); define the level of performance it needs in terms of packet loss, latency, and jitter; control which kinds of sites it can touch, and how

they will talk to each other, e.g. directly (as in a mesh) or indirectly (as with a hub-and-spoke) or in some hybrid of the two.

By taking an app-centric approach to the network, SD-WAN shifts the focus of management to a business-relevant level: applications are where staff and customers live. It makes reporting on application performance easier than ever, too. For the first time, the WAN infrastructure can directly support business-relevant SLAs. No more need to make or accept performance promises on things like packet loss and latency generically. And, IT and the business can look at performance for specific applications' traffic without having to layer on a whole separate network performance monitoring infrastructure.

The application focus also allows an SD-WAN to provide traffic prioritization. Policies allow flexible assignment of classes of traffic to classes of connectivity: e.g., *"Packets in class A always get the lowest-latency path available, and take priority over packets in other classes."* That way, the use cases the organization cares about the most always get the level of performance they need (if it is at all possible to deliver) and suffer graceful and minimized performance degradation when equally urgent needs compete.

SD-WANs can also optimize application traffic in other ways to try to hit performance requirements. Common enhancements include forward error correction, which adds a bit of overhead to every packet sent in order to allow dropped packets to be reconstructed rather than retransmitted; and packet replication, which has the same packet sent along multiple paths, with the first to arrive being used.

Economics and the SD-WAN: More is Better, and Now Cheaper

By allowing the WAN to make simultaneous use of multiple types of links from multiple providers at a location, including business Internet, broadband, and even wireless WAN using 4G (and soon 5G), SD-WAN reframes the cost calculations around the branch.

First, it creates the possibility of substituting less expensive Internet connectivity for some or all of the more-expensive MPLS services at a location. This can reduce the cost per Megabit per second (Mbps) by 50 to 90 percent. While the majority (57%) of SD-WAN adopters that use MPLS plan to continue to use it as one flavor of connectivity in their SD-WANs, most do plan to cap or reduce spending by using it more selectively.

Second, it makes installing more links sensible at most locations: the SD-WAN can use all it gets, and more networks means better resilience and more options for managing traffic to hit all SLAs.

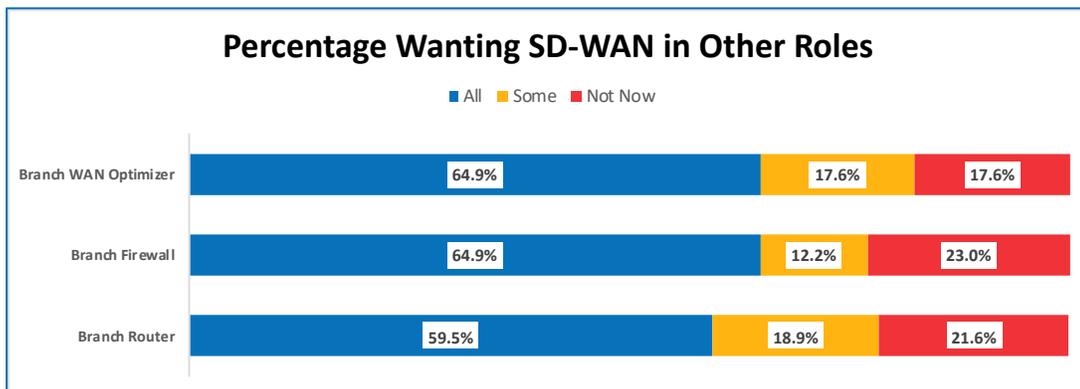


Figure 3: Roles IT wants SD-WAN to fill in some or all branches

Third, it inverts the conversation around bandwidth. In an MPLS-Plus-Internet-failover world, IT asks “how little can I get away with” due to the cost of the service. In the SD-WAN scenario, IT asks “how much do we need now and for the future” and can craft a combination of Internet with or without other services to meet those needs affordably.

Lastly, SD-WAN solutions offer the opportunity to consolidate the existing branch network stack into a single solution, a “branch in a box” approach that is highly appealing to IT both for the improved simplicity and the added agility that comes with replacing hardware with software. In fact, large majorities of those deploying SD-WAN want to use it to replace routers, branch firewalls, and WAN optimizers.

The Message is Clear: Evaluate SD-WAN

Every IT team should be asking itself: Can the WAN architecture in place deliver on digital transformation, at sustainable costs? Or does it have to become more reliable, more agile, and deliver higher bandwidth at lower rates? Can it provide increased visibility and greater control, and be easier to manage? If the answer is no on any of those, SD-WAN may be the best way to power the changes needed. Any organization that is in the midst of transformative change, contemplating embarking on one, or even just looking for a way to deliver better WAN services for less money should be evaluating SD-WAN.

Build an SD-WAN Business Case

IT now must build a compelling business case for making the transition, or risk wasting more staff time and company money on the status quo. IT should model the cost of growing with the current architecture to meet future needs, and compare that against do-it-yourself and managed SD-WAN options and the business value they can deliver.

Hard Dollar Savings for the Future

The base of the case must be cost: SD-WAN can stop the ballooning growth of WAN costs and even cut WAN service bills while delivering substantial improvements in performance and availability. By shrinking or eliminating MPLS links at branches, replacing them with cheaper Internet-based access, IT can permanently bend the cost curve downwards,

supporting substantial growth within the current financial footprint and reducing the marginal cost of growth in the future.

Operational Savings: Freeing IT Resources for Strategic Work

SD-WAN can also dramatically reduce the amount of staff time required to manage the WAN particularly the time needed to bring a new site or service online. Even before a DIY rollout is complete, IT can reduce the amount of staff time required to manage the WAN by more than 30%. And shifting to a managed SD-WAN can reduce that even further, moving most IT effort into policy definition and consultation with the business on its needs and plans.

The Business Value of Doing Business: Agile Branching, Reliable Services

SD-WAN can reduce both the number and the duration of branch outages, by providing dynamic redirection of packets from failing links to surviving ones, and by making it easier than ever to mix connectivity from different providers using different connectivity media and different physical routes. Fostering multiple levels of redundancy in this way means that with SD-WAN, branches can get more business done uninterrupted. Those furthest along in their deployments (better than 90% deployed) report a 69% reduction in annual time off line at the average site, and an 80% reduction in the duration of a typical outage.

Moreover, because IT can mix and match connectivity at the branch, and transparently add and drop connections without interrupting business, SD-WAN can get branches in production faster than ever. The average wired Internet link turn-up time is 16 days, and a wireless connection can be turned up instantly. Bringing the branch up faster—having it doing business for 16 or more additional days, has definite (and often quantified) business value that can be added to the business case.

This kind of change in the delivery of core services can reposition the network as a strategic enabler of transformative efforts and IT as a key strategic contributor to them “The firm is experiencing heavy growth and staff additions as well as entering new countries and markets,” notes the director of infrastructure at a large financial services firm. “The infrastructure needs to be robust and easy to adopt.”

Too Much of a Good Thing: Watch Out for Vendor Sprawl

The great thing about SD-WAN is that it frees IT to get branch links from the lowest-cost Internet Service Provider (ISP) in each branch’s area. The terrible thing about SD-WAN is...if IT uses the lowest cost provider at each location to bring costs down as much as possible, it can wind up with more ISPs than branches. Such an explosion in the number of providers—vendor sprawl—has real costs.

The costs associated with vendor sprawl include both administrative and operational costs. Administrative costs come with each new contract to track, each new billing relationship to manage, each new SLA to watch, each new dispute process to master. Operationally, costs accrue as IT has to manage the service relationship with each new vendor, especially the coordination of technical support processes and staffs, especially incident response when

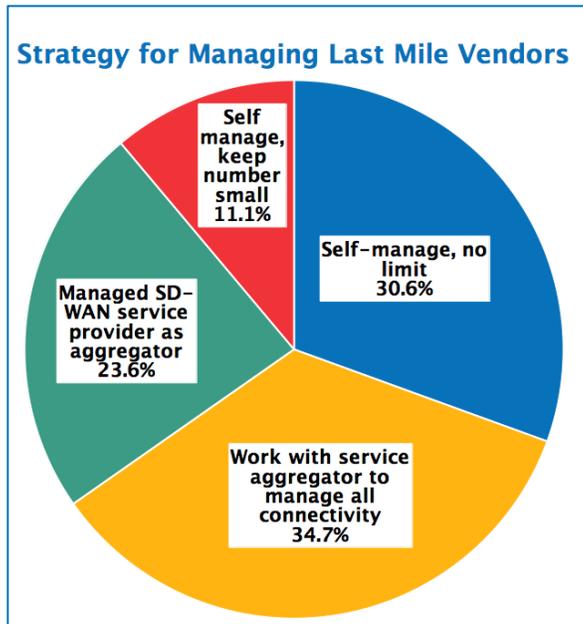


Figure 4: Majority Want Others to Manage Last Mile

there are problems. There are always problems, of course, and although SD-WAN solutions do their best to make them non-events for the enterprise, IT does still have to make sure they get resolved.

Provider sprawl can be a significant obstacle to truly streamlining WAN operations with SD-WAN, and undermines the cost savings IT looks for. Consequently, avoiding or solving the sprawl problem is on the minds of SD-WAN users looking for a simpler WAN experience in the future. More than 58% of organizations plan to outsource the problem of coping with the last mile, whether by using last-mile connectivity service aggregators to

rein it in (34.7%) or by using a managed SD-WAN provider that will handle that as well. Not all SD-WAN providers offer last-mile management. Some allow a BYO approach and manage any connectivity the enterprise brings with it; others will only support connections with a specific set of ISP partners.

It's important to remember, also, that SD-WAN solutions can provide performance data on each link that will pinpoint the nature and onset of any issue, and flag problems to IT's attention even as they route around the problems. The better the solution is at keeping IT informed, and the better it is in assisting with multi-vendor management (for example being able to send a repair ticket to the provider of the link), the more value it can bring over all.

Conclusion

To get the WAN the business needs now and in the future, IT must build its business case for SD-WAN around the business value it can deliver. The business case should squarely target digital transformation projects and use cases that are central to the enterprise's overall business strategy. It has to underscore the increasing centrality of the WAN not just in meeting the current and imminent challenges, but in smoothly handling the next set as well, all while avoiding explosive growth in connectivity costs. It should also highlight SD-WAN's ability to position the network as a strategic enabler of transformative efforts by being agile enough to provide connectivity with no substantial lead time—to never be the thing holding up the Next Big Thing.

IT professionals should:

- Evaluate the current WAN in the context of planned and proposed digital transformation projects; is it able to meet projected needs for flexibility, agility, capacity, reliability, performance, and security, and at a reasonable cost?
- If not, model the costs and business value of SD-WAN solutions
 - Evaluate both do-it-yourself solutions and managed solutions, at least two or three of each type.
 - Model shifts to various mixes of different types of connectivity, and an increase in dependence on multiple Internet links for some or all bandwidth in each type of location.
 - Evaluate shifts in capital, connectivity, and operating costs with each architecture and tool.
- Evaluate your WAN for potential ISP coverage of each location, and pick your vendor management strategy for handling last mile links.
- Seek an SD-WAN solution that simplifies deployment and a vendor or provider that can work with you closely to ensure a smooth and swift transition.

About Nemertes: Nemertes is a global research-based advisory and consulting firm that analyzes the business value of emerging technologies. Since 2002, we have provided strategic recommendations based on data-backed operational and business metrics to help enterprise organizations deliver successful technology transformation to employees and customers. Simply put: Nemertes' better data helps clients make better decisions.