



White Paper

SD-WAN: Aligning the Network with Digital Transformation, Cloud, and Customer Engagement

Sponsored by: Windstream

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IDC OPINION

Digital transformation is a growing, urgent imperative for enterprises and organizations worldwide. Network resources to support digital initiatives are coming under intense scrutiny. Increasingly, that focus concentrates on the wide area network (WAN), which provides essential connectivity and valuable network services for branch offices, remote sites, and mobile workers. These are the environments in which organizations transact business and engage directly with customers on a daily basis.

The software-defined WAN (SD-WAN) has emerged as the solution for a modern business environment dependent on the cloud and a workforce requiring anytime, anywhere access. IDC research shows that for many enterprises, the need for SD-WAN will be acute, especially where an organization's application profile is migrating toward public cloud services and where customer engagement is most valued. In fact, IDC forecasts that by 2020, the worldwide SD-WAN market for infrastructure and services will exceed \$6 billion.

This white paper examines how digital transformation and cloud computing have necessitated a significant reassessment of the WAN. It also considers how and why SD-WAN has arisen as a technological answer to that challenge. Further, it looks at Windstream's approach to SD-WAN, which takes the form of a solution that leverages technology from SD-WAN vendor VeloCloud and combines it with Windstream's extensive portfolio of customized professional services and long-established network capabilities.

SITUATION OVERVIEW

Digital transformation – the process of creating value, growth, and competitive advantage through new digital offerings, business models, and business relationships – is irrevocably changing the way business gets done. Enterprises worldwide, across all geographies and vertical markets, have made digital transformation a business imperative rather than an option. They realize that organizations that fail to embrace and execute on digital transformation risk dire consequences, including long-term business irrelevance.

Indeed, in a world defined by digital transformation, competition is increasingly intense. Organizations that are first to leverage technologies that improve customer experiences will prosper.

Not surprisingly, cloud is at the forefront of most companies' digital transformation strategies. IDC forecasts that public IT cloud services revenue will exceed \$141 billion in 2019, recording a compound annual growth rate (CAGR) of 19.4% – almost six times the rate of overall IT market growth. In 2019, public IT cloud services will drive 20% of the \$716 billion aggregate revenue generated by demand for applications, development and deployment tools, infrastructure software, storage, and servers. By 2018, more than half of enterprises' IT infrastructure and software investments will be cloud based, reaching 60-70% of IT spend by 2020. For enterprises, the pursuit of digital transformation initiatives without a robust cloud-IT foundation will be utterly impractical.

For cloud computing, the consequences of the wide area network have huge significance. As public and private cloud continue to grow, WAN performance becomes absolutely critical to application delivery and business success. Without a solid, reliable network infrastructure, you cannot run a digital business.

Cloud Drives WAN Transformation

As enterprises move mission-critical workloads and business processes to the cloud, there is a greater need to fully integrate cloud services into WAN architectures. This ensures application visibility, control, performance, availability, enhanced analytics, and security. Unfortunately, enterprises often lack visibility into what applications are being utilized across their private and public clouds and across their WANs. As a result, they don't fully appreciate the extent to which their WAN is critical to application performance. It's no longer enough to just be concerned about bandwidth; enterprise managers also need visibility to understand what applications are being used across the WAN and controls to set application-based business policies. This is how the WAN can be transformed to improve application performance and enhance user experience.

Although WAN optimization and other traditional WAN enhancements have been used in the past to address traditional application performance constraints, new capabilities must emerge to meet the requirements of cloud computing. Consequently, we have witnessed the rise of the hybrid WAN and the software-defined WAN. These WANs leverage the principle of software-defined networking (SDN) and adapt to the needs of organizations seeking to optimize application delivery across the distributed enterprise and the cloud.

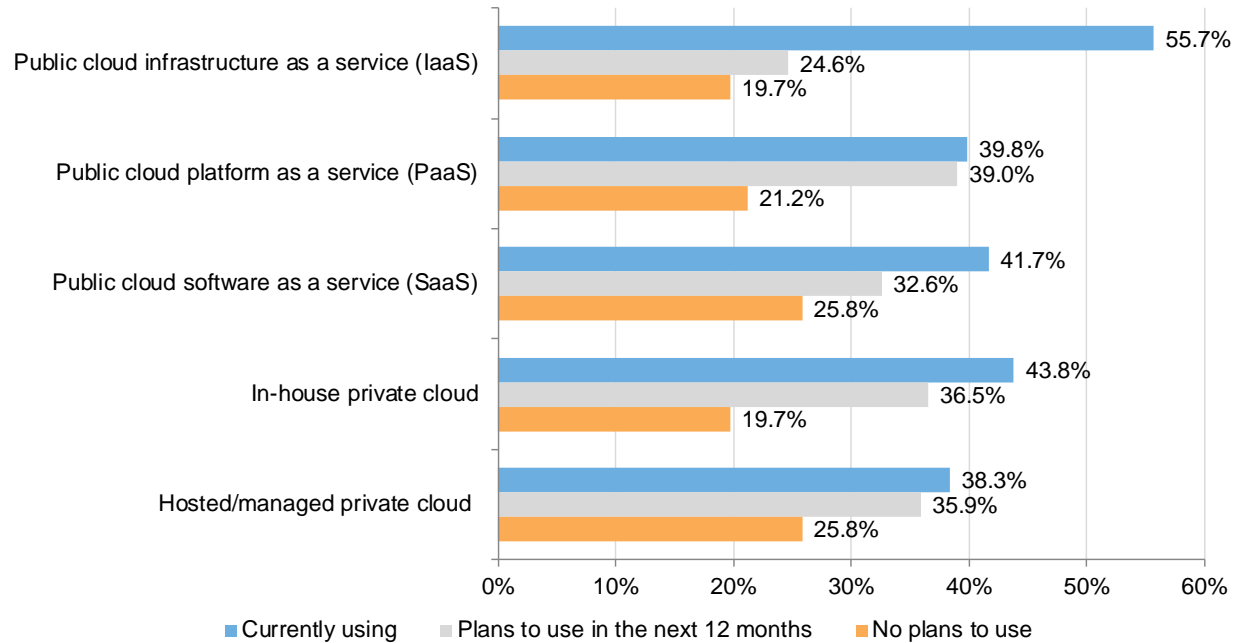
SD-WAN will be particularly relevant for enterprises that have adopted or are adopting hybrid cloud and especially for those that are leveraging SaaS applications. In this context, there is a strong motivation to reassess WAN architectures. What made sense on the WAN when client/server applications were housed exclusively in an enterprise datacenter does not make sense when applications reside in a public, private, or hybrid cloud configuration. Hybrid cloud demands an application-based approach to service delivery at branch offices and remote sites. This supports broadband internet and 4G/LTE technologies as well as traditional VPNs and MPLS and has the intelligence to steer traffic across the best-performing path, thereby ensuring optimum application performance.

There's no doubt that cloud initiatives are driving a thorough reconsideration of WAN architectures and strategies. In IDC's recent *Software-Defined WAN (SD-WAN) Survey*, IDC found that most enterprise respondents are currently using or planning to use a range of cloud services, with nearly 56% indicating that they are using public IaaS, about 44% signaling the use of in-house private cloud, and nearly 42% indicating that they are using SaaS (see Figure 1). Within the next 12 months, about 80% will be using IaaS and in-house private cloud to some degree and approximately 74% will be using SaaS. About 74% said they will be using hosted/managed private cloud.

FIGURE 1

Current and Future Plans of the Use of Cloud Services

Q. What type(s) of cloud services or resources is your organization currently using and planning to use in the next 12 months?



n = 605

Base = all respondents

Notes:

The survey is managed by IDC's Quantitative Research Group.

Data is not weighted.

Use caution when interpreting small sample sizes.

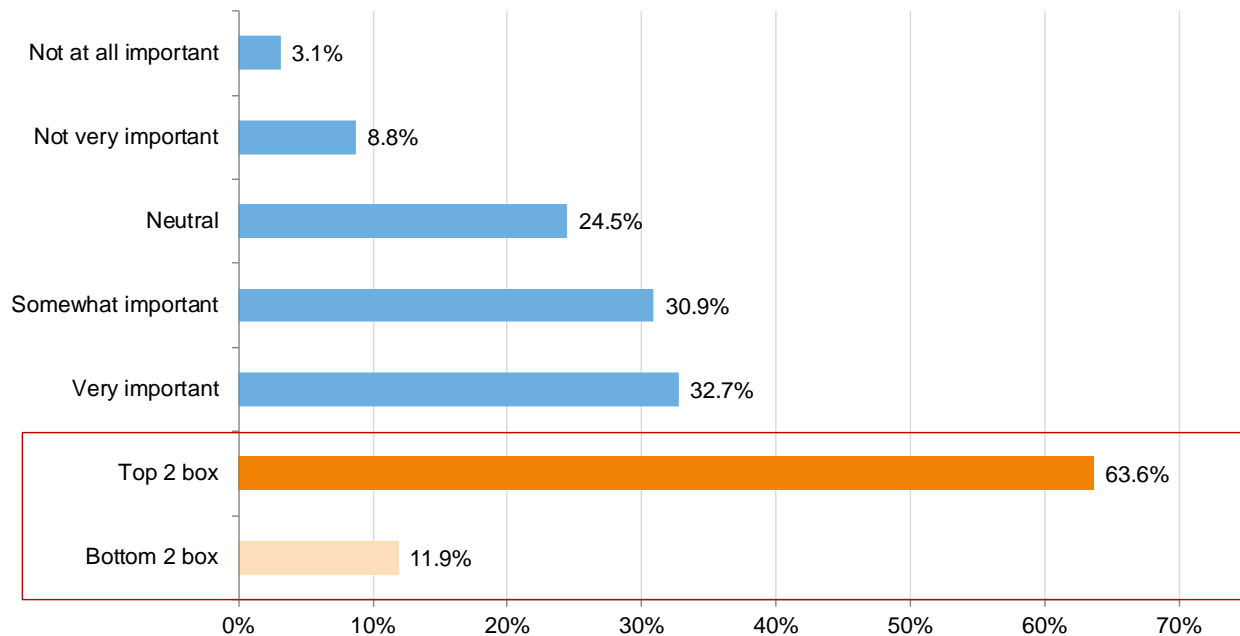
Source: IDC's *Software-Defined WAN (SD-WAN) Survey*, April 2016

Further, the importance of SaaS to the design of and requirements for enterprise WANs is expected to increase sharply in the next two years. Nearly 33% of enterprise respondents to IDC's *Software-Defined WAN (SD-WAN) Survey* indicated that SaaS will be very important to their organizations' WAN technology choices and planning in the next 12-24 months (see Figure 2). Another 31% of enterprise respondents think it will be somewhat important. SaaS is a top constituent of the enterprise WAN and therefore highly influential in WAN decisions.

FIGURE 2

The Growing Importance of SaaS for WAN Planning

Q. Please rate the importance of SaaS/cloud services in your organization's WAN technology choices and planning currently and in the next 12-24 months.



n = 605

Base = all respondents

Notes:

The survey is managed by IDC's Quantitative Research Group.

Data is not weighted.

Use caution when interpreting small sample sizes.

Data is based on a scale of 1-5, where 1 = not at all important and 5 = very important.

Source: IDC's *Software-Defined WAN (SD-WAN) Survey*, April 2016

The growth of the internet of things (IoT) will also have massive WAN implications. While it is still a maturing market, the growth of connected things such as cars, refrigerators, lawn sprinklers, power generators, and medical devices comes with an increased need for smarter capacity and bandwidth management. Cloud and IoT, as well as other strategic IT initiatives, drive customer engagement and are crucial elements in digital transformation. For their part, customers expect the business that serves them to provide engagement that is characterized by five key attributes: personal, ubiquitous, secure, relevant, and mobile.

SD-WAN Answers the Call

SD-WAN and the associated concept of hybrid WAN make the challenges of digital initiatives manageable on the enterprise network. At this point, it makes sense to define our terms, specifically the terms *hybrid WAN* and *SD-WAN*.

According to IDC's definition, a hybrid WAN includes at least two WAN connections from each branch office and leverages two or more different networks (MPLS, broadband internet, 3G/4G, etc.). SD-WAN leverages hybrid WAN in an active/active configuration, and it also includes a centralized, application-based policy controller; analytics for application and network visibility; a secure software overlay that abstracts underlying networks; and an SD-WAN forwarder (routing capability). These technologies are combined in the SD-WAN to provide application-defined intelligent path selection across WAN links (MPLS, broadband internet, LTE, etc.) based on policies defined on the controller.

SD-WAN business benefits include providing the cost-effective delivery of business applications, satisfying the requirements of the modern branch/remote site, accommodating SaaS- and cloud-based services, and improving branch-IT efficiency through automated service provisioning. To be sure, a well-designed SD-WAN solution can provide improved application performance, especially in relation to cloud applications and services, while providing cost-effective bandwidth and delivering 100% uptime.

Although SD-WAN derives from the core principles of SDN, its value proposition stands on its own. SD-WAN offers compelling value for its ability to simplify and automate WAN operations, improve application traffic management, and dynamically and securely deliver on the cost efficiency benefits associated with intelligent path selection across the hybrid WAN.

In this context, enterprises can use SD-WAN to prioritize applications across the WAN or monitor application performance and steer traffic over cost-optimal or the most reliable WAN links, depending on application requirements. Similarly, enterprises using cloud-based applications can benefit from SD-WAN's ability to route traffic directly over the internet to and from cloud services and branch locations.

IDC believes that SD-WAN's value proposition – predicated on the growth of cloud computing, the need for simplified but secure VPN capabilities, and the business imperative of accessing cost-effective bandwidth – is compelling. This is particularly true for a growing number of enterprise customers seeking to provide cloud-era networking to branch offices and remote sites. Indeed, IDC forecasts that the worldwide SD-WAN market for infrastructure and services will exceed \$6 billion in 2020.

As noted previously, demand drivers for SD-WAN include not only the increased adoption of cloud services – which necessitate increased WAN bandwidth, agility, and flexibility – but also the increasing cost and complexity of managing enterprise WANs and the steady migration of enterprise data traffic from private MPLS WANs to the internet.

The rise of SD-WAN signals far-reaching contextual changes in the role of the network. The network has always provided essential support for mission-critical application workloads. Now, SD-WAN provides the network with an opportunity to go from being a perceived "cost center" to being a valuable business enabler. In effect, the network becomes an integral component of service offerings and not just an operational must-have.

With so much at stake, successful SD-WAN deployments will turn on factors that extend beyond technology. Much will depend on the extent to which enterprise IT teams are willing and able to adopt technologies that are integral to SD-WAN, especially virtualization, automation, and orchestration.

SD-WAN moves the operational focus away from configuring network devices manually using the command-line interface (CLI) and more toward an automated, proactive, user-friendly, policy-based approach. Enterprise IT departments must be willing to embrace, rather than resist, this change. Network engineers need to shift their energies from defining routing tables to creating the policy for use cases and profiles.

OVERVIEW OF WINDSTREAM'S SD-WAN SOLUTION

Responding to the enterprise need for WAN transformation, Windstream has launched an SD-WAN solution based on technology from SD-WAN vendor VeloCloud. Windstream augments that technology with personalized and proactive expert guidance delivered through the Windstream SD-WAN Concierge Service. Windstream believes that the combined value of the VeloCloud technology with Windstream's fully managed Concierge Service constitutes a strongly differentiated SD-WAN offering.

Windstream selected VeloCloud as its SD-WAN technology partner, and VeloCloud's technology provides the basis for Windstream's multitenant SD-WAN solution. Windstream's SD-WAN gateways are deployed throughout the Windstream nationwide network to create a "cloud core" that directly interconnects with Windstream's MPLS network and cloud-based UCaaS, security, and cloud connectivity. The VeloCloud technology offers APIs that allow for integration with Windstream's network management application, providing customers real-time application and network visibility and control.

Key features of Windstream's SD-WAN offering include:

- **Application visibility and control.** Applications can be prioritized on the basis of business policies, and visibility is provided through the centralized cloud-based network management application.
- **Dynamic WAN selection.** Minimum performance benchmarks can be set on a per-application basis and can be adjusted automatically.
- **Application optimization.** The service allows the customer to continuously monitor and improve network paths based on performance benchmarks and includes forward error correction and jitter buffering.
- **Secure network deployment.** The SD-WAN service automatically sets up IPSec tunnels with end-to-end encryption, enabling dynamic branch-to-branch connectivity.
- **Stateful firewall.** An integrated stateful firewall allows for the deployment and management of security policies, which can be managed centrally with options for edge overrides by location. In addition, application layer filtering provides some next-generation firewalling capabilities.
- **Network analytics.** Real-time analytics allow for policy creation and troubleshooting and provide insights into application utilization and bandwidth consumption.

Windstream believes its SD-WAN differentiation derives from four essential capabilities, which are discussed in the sections that follow.

Concierge Service

The fully managed Windstream SD-WAN Concierge is designed to help customers get the most from SD-WAN, delivering continuous and proactive monitoring and optimization of network environments. An assigned service manager provides personalized guidance, analyzes network and application performance, and recommends actions needed to optimize the value from customers' network

investments. Professional service support options include network diagnostics and design as well as SD-WAN integration/implementation.

The Windstream SD-WAN Concierge provides personalized guidance designed to enable customers to maximize the value of SD-WAN while focusing their resources on delivering innovations related to digital transformation. Windstream's SD-WAN specialists create, adjust, and deploy application and security policies based on real-time analytics and business requirements. Concierge is designed to be affordable so that it can be leveraged by enterprises of all sizes.

For customers that possess experienced IT and network teams, Windstream also offers a self-service option that gives them the ability to manage the SD-WAN solution through Windstream's network management application.

Business Aware Cloud Network

Windstream's Business Aware Cloud Network is designed to improve cloud-based application performance through low-latency connections to cloud providers as well as through Windstream-provided services. The network enables dynamic, real-time traffic steering to provide the flexibility, agility, and reliability necessary for application performance. Windstream believes its ISP heritage, including its deep experience in last-mile access options and managing hybrid networks for customers of every size, is a key advantage over other network service providers.

For mission-critical applications that must be running continuously, a Windstream SD-WAN with dual-access connections provides an active/active network configuration that includes a 100% SD-WAN service availability SLA (customers receive a service credit in the event Windstream does not meet this objective).

Tailored Industry Solutions

Windstream delivers a suite of consulting and professional services specifically designed to improve customer experience.

Along these lines, Windstream's BRP retail consulting group, formerly Boston Retail Partners, allows Windstream to deliver a comprehensive approach to IT consulting and network service management for retail businesses seeking to enhance customer experiences and gain competitive advantage. With BRP, Windstream is capable of solving a wide range of problems for retail customers while helping them identify opportunities to improve operational and financial performance. BRP's full portfolio of services includes assisting retailers with IT strategy, vendor selection, business process alignment, training, project leadership, quality assurance, and solutions implementation.

These are all in addition to Windstream's offerings of cloud-based unified communications, security, and WiFi services.

Cloud-Optimized Management

Windstream's cloud-based network management application provides visibility and control for its SD-WAN customers through a single interface. The management tool facilitates zero-touch configuration for new locations, services, and security policies. It also provides control over business policies and enables application prioritization based on location, user, and time/date while allowing for real-time changes that can dynamically optimize application performance and customer experience. The management platform also provides real-time performance analytics and insights, which can be

leveraged to enhance overall business productivity, while enabling management and control over other services, including voice, WiFi, and security functions such as firewalls.

Windstream believes that its SD-WAN solution delivers a business-aware cloud network that is designed to improve cloud-based application performance through low-latency connections to major cloud service providers. The network also provides dynamic, real-time traffic steering.

Windstream contends that its consulting and professional services – which have helped a number of well-known brands initiate digital transformation initiatives to improve customer experiences – represent a key market differentiator. This is particularly true in the retail industry, where Windstream's BRP retail consulting group offers a broad and deep array of consulting capabilities that also extend into day-to-day delivery operations.

IDC GUIDANCE

IDC believes that WAN transformation will be necessary and pervasive for most enterprises worldwide. This is particularly true for any forward-thinking enterprise pursuing digital transformation and especially for those embracing cloud computing as a means to realizing digital transformation.

IDC strongly believes that SD-WAN is a natural progression from and a corollary to SDN in the datacenter, with network virtualization gradually becoming pervasive across the hybrid enterprise. The need for automated agility and application-based policy control is extending outward from the datacenter and across the WAN to branch offices and remote sites. Both SDN and SD-WAN should be viewed as the network's belated but necessary adaptation to the requirements of the cloud era.

For many enterprises, the need for SD-WAN will be even greater than the need for SDN in the datacenter, especially when an organization's application profile is migrating extensively toward public cloud services and where customer engagement is most valued. For these enterprises, cost effectively and securely delivering public cloud applications to branches and remote sites takes on comparatively greater importance, even as they maintain legacy client/server applications in their private datacenters.

That said, IDC believes that SD-WAN and WAN transformation, in general, will be closely accompanied or followed by a renewed focus on network and security services at branch offices and remote sites worldwide. Having pursued network virtualization in the datacenter and across the WAN to the edge of the branch, enterprises will look to extend automation and virtualization throughout branch and remote sites, deploying platforms and technologies that allow for automated provisioning and remote management of WLANs, firewalls, and a range of other network and security services.

The network is essential to the success of digital transformation. In fact, the network is more important than it has ever been to enterprise business success. As most enterprises adopt a variety of public and private cloud services, including SaaS applications and IaaS offerings, the WAN will gain a higher profile, gaining much-needed attention as well as perhaps unwelcome scrutiny.

After evaluating their WANs in relation to their changing needs, many organizations will conclude that their current WAN architectures and technologies are not up to the challenge of supporting meaningful digital transformation and cloud initiatives. The current WAN will be lacking in areas such as agility, flexibility, visibility, performance, security and, perhaps most important, ongoing operational cost. In key respects, the WAN will also be seen to be lacking in its ability to deliver on customer engagement, which is essential to business transformation across a wide range of industries.

As digital transformation compels enterprises to cultivate deeper relationships with customers and create new revenue streams based on technology-enabled products and services, it will assuredly demand more from the network, especially from the WAN. This is the need to which SD-WAN is responding and why SD-WAN will become a linchpin to high-priority digital transformation and cloud initiatives.

In consideration of these market trends and customer requirements, Windstream has developed an SD-WAN solution that is predicated on SD-WAN technology from VeloCloud as well as its own portfolio of customized professional services and preexisting network capabilities. As such, Windstream has demonstrated empathy for and an understanding of customer priorities across a range of vertical markets, and the resulting solution is designed to help customers execute on digital transformation, embrace cloud, and enhance the degree to which they engage with their customers on a daily basis.

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