



# DoyleResearch

## SD-WAN Becomes the Network

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*Sponsored by VeloCloud, now Part of  
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## Executive Summary

The network of yesterday is not the network that can take businesses into the future. As mission critical enterprise applications move to the cloud, wide area network (WAN) must adapt to become agile, flexible, and scale rapidly. Leading IT trends such as Internet of Things (IoT), Software as a Service (SaaS), cloud storage, enterprise mobility, emerging transport alternatives, and globalization increase the importance of how network assets are leveraged and how the network is conceptualized. The advantages of public and private data centers and cloud-based applications are significantly diminished if the network is slow, inflexible, and unpredictable. Erratic network performance with high latency, jitter and packet loss can significantly impact user adoption, satisfaction, and overall corporate productivity.

As connectivity options continue to emerge, end users are no longer tethered to the office or to the localized applications and services that were trademarks of a primary or branch office. With more end users on the move or working from distributed locations, the need to access corporate applications and data 24/7/365 from multiple devices is on the rise. These users require the same experience in their remote offices as does a person located at a primary business location. The Internet provides global access for cloud applications, but is limited by poor reliability, unpredictable performance, and weak security. The solution is to orchestrate network management and visibility from a centralized, cloud location to better control traffic flows and leverage all available links (e.g. a hybrid WAN) for optimal reliability.

The increased deployment of cloud applications, storage, hosted voice, video, mobile applications, and the emergence of IoT has challenged IT and business managers to provide high-quality WAN services to the branch. Organizations typically rely on multiple cloud platforms (e.g. Amazon, Microsoft and Google) and must transmit and migrate data to and from these platforms in real-time. Deploying and managing the WAN has become more challenging and costly as traffic flows are decentralized. The solution for many organizations is to place network intelligence in the cloud to monitor, steer, and secure traffic flows. Software-defined WAN (SD-WAN) offers compelling advantages for distributed organizations with critical branch operations, including the benefits of business agility, optimized application performance, and increased bandwidth efficiencies.

## Trends in Cloud Adoption

The adoption of cloud computing, cloud storage, and SaaS has rapidly changed the way users access applications and data. As the functionality, security, and performance of SaaS applications has improved, the usage of popular SaaS applications like Salesforce.com, Google Docs, and Microsoft Office 365 has skyrocketed. Every day millions of workers access cloud services such as Amazon Web Services and Microsoft Azure, cloud-based storage (e.g. Box and Drop Box), unified communications services (e.g. Ring Central, Vonage Business, Skype for Business) and conferencing applications like Go-to-Meeting, Zoom, WebEx. Organizations are leveraging multi-cloud platforms as a strategic part of their IT strategy.

Industry analysts expect the use of cloud-based computing and applications to grow strongly over the next five years. Research conclusions include:

- IDC predicts that worldwide spending on public IT cloud services will grow from \$160 billion in 2018 to more than \$277 billion in 2021.
- According to Right Scale, 81% of enterprises have a multi-cloud strategy.
- According to Gartner, 30-50% of large enterprise traffic is shifting to the cloud.

The reality is that the majority of the workforce (approximately 70%) is located far from corporate headquarters, either at branch offices or at remote/home offices. IT organizations must provide branch users with fast, reliable, and secure access to cloud-applications that are critical to their ability to do their job.

## The Cloud is an Ideal Platform for the WAN

The growth in globalized business operations, increasingly dynamic remote offices, and adoption of cloud-hosted apps and data have created new challenges for IT managers tasked with providing secure, reliable access to cloud-based applications. End-user experience and satisfaction are directly related to a network's responsiveness, so IT departments must concern themselves with latency, packet loss, and jitter if they are

going to ensure consistent performance for business-critical cloud-based applications. As branch office deployment becomes increasingly pervasive and the distribution and availability of cloud-based applications are everywhere, IT organizations must adopt new strategies for delivering WAN connectivity.

Due to rigid architectures, complexity, and cost concerns, the traditional model of connecting branch offices to centralized, physical data centers via T1s, Frame Relay, or MPLS cannot scale to meet these needs. Employees and customers need to connect to cloud-based applications directly via high speed Internet access. A new, reimagined WAN requires solutions that leverage the benefits of the Internet (speed, ubiquity) with a fabric to connect distributed users to distributed applications. Network intelligence based in the cloud can remediate network (Internet) challenges to reduce jitter, packet loss, and improve redundancy. By providing diversity in network access, re-routing and optimizing traffic when necessary, an intelligent network can improve reliability and ensure high quality of user experience.

Security is a critical concern due to the distributed nature of cloud applications and remote users who can no longer be fully controlled by IT. As security perimeters break down, security and policies need to be embedded within the network. A new WAN provides enhanced security by monitoring and applying policies across network traffic, applications and users. In addition to native security, SD-WAN platforms must work seamlessly with an ecosystem of security partners, interoperating seamlessly with their best-in-breed solutions.

The solution for organizations with a distributed workforce is to deploy software defined wide area network (SD-WAN) solutions – see Figure 1. SD-WAN solutions consist of centrally managed WAN edges (physical or virtual) deployed in branch or remote offices. SD-WAN provides the following capabilities:

- Leverages the abundant availability of ordinary broadband links like Cable and DSL to augment the existing MPLS to connect efficiently to cloud resources
- Simplifies business operations for all remote employees to access cloud resources without hair-pinning through the corporate datacenter
- Centralize and orchestrate the branch office WAN network via a cloud console and

eliminate the need for truck rolls to implement branch network changes

- Deploy secure connectivity to all branch offices and simplify the setup of site-to-site VPNs
- Deliver link quality remediation over private and public transport
- Enable bi-directional quality of service across public transport (such as Internet) directly to and from cloud applications, compute, storage and Internet applications
- Leverage cloud hosted services for scalable, redundant connectivity to both enterprise and cloud datacenters without network reconfiguration

SD-WAN technology delivers the network intelligence required to connect an increasing remote work force with cloud-based applications and data.

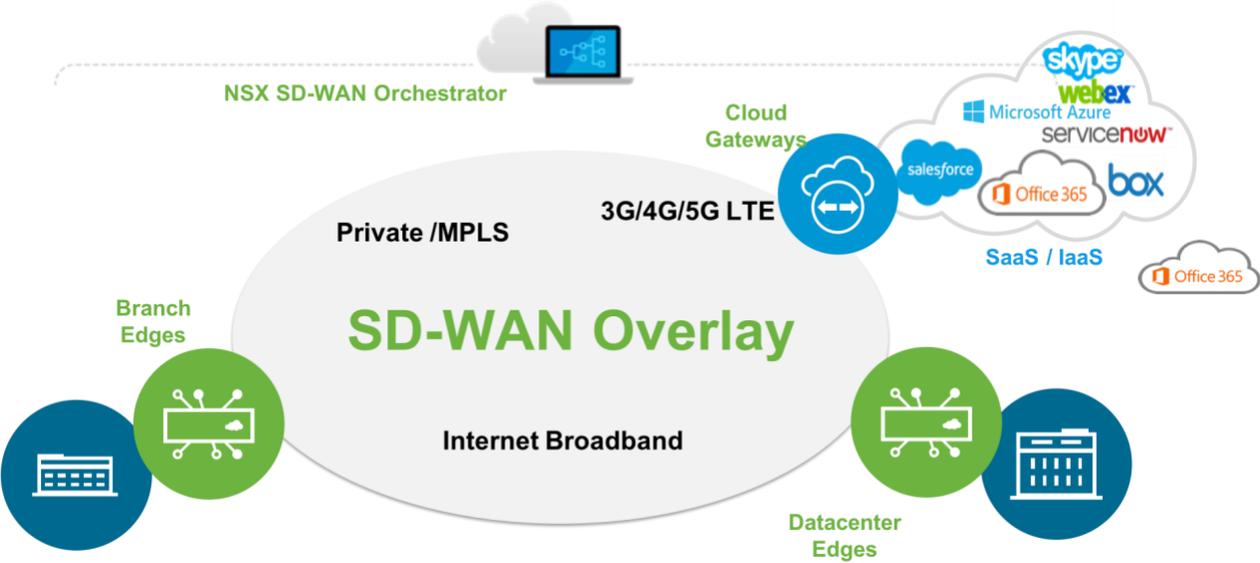


Figure 1: Cloud-Delivered SD-WAN

## SD-WAN Use Cases

Cloud-based WAN solutions are installed in a number of use cases across different verticals including:

- **Hybrid WAN:** Organizations migrate to SD-WAN by adding Internet circuits to their existing MPLS networks to improve available network bandwidth and to provide faster access to cloud resources for remote branch users. This architecture also improves reliability and reduces overall connectivity costs.
- **Unified Communications:** IT organizations faced with inconsistent unified communications (UC) quality are leveraging the benefits of hosted voice and video with the SD-WAN traffic steering and packet conditioning capabilities.
- **Temporary Office Access:** Organizations, such as retail and construction, are constantly provisioning remote office access to pop-up retail stores and new construction sites. SD-WAN's ability to quickly and easily provision secure WAN connectivity via Internet, LTE (3G, 4G, 5G), or satellite links is ideal for rapid connectivity access.

## VMware NSX SD-WAN by VeloCloud

Founded in 2012 and acquired in 2017 by VMware, VeloCloud, now part of VMware is a cloud-delivered software-defined network provider. NSX SD-WAN by VeloCloud has helped over 4,000 customers across all vertical industries with their WAN challenges and works closely with its network of over 60 service providers to deliver these services. Its architecture consists of the following:

- A cloud SD-WAN Orchestrator provides centralized configuration, real-time monitoring and control plane automation
- Customer premises-based Edges and Virtual Edges installed in primary offices, branches, and data centers
- Gateways offered as a service by NSX SD-WAN and its provider partners at top transit POPs and cloud datacenters around the world. Gateways provide SD-WAN functionality for both on-premises and cloud-based sites.

The solution is delivered either as a service subscription and more traditional purchase model.

NSX SD-WAN's solution provides a broad SD-WAN feature set including automation application recognition and categorization for traffic prioritization, dynamic WAN circuit and path selection and remediation, and ease of deployment, management, and change. Additionally, NSX SD-WAN's microsegmentation capabilities, which are available from the cloud data center to the branch office, enable users to decide how traffic should be aggregated and/or separated from each other and its travel path along the network. See Figure 2 for an overview of NSX SD-WAN's microsegmentation architecture.

NSX SD-WAN's partners include:

- Security partnerships with Zscaler, Palo Alto Networks, Symantec, and Check Point
- IT partnership with HP's Open NFV alliance and Intel NetBuilders
- Cloud infrastructure partnerships with Google Cloud Platform, Equinix, HP, Intel, Console, Amazon Web Services, Microsoft Azure, Microsoft Office365, Microsoft Virtual WAN with Azure, NEC/Netcracker, and IIX

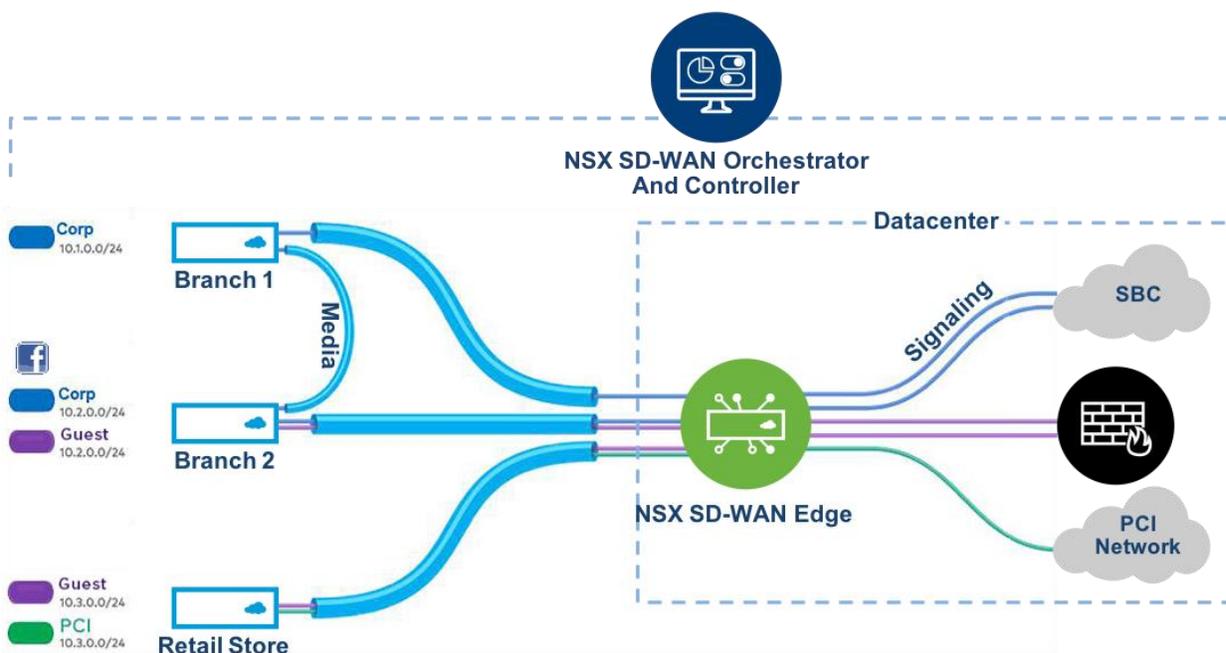


Figure 2: Microsegmentation by NSX SD-WAN by VeloCloud

## Conclusions and Recommendations for Customers

The increased popularity of cloud-based platforms, including compute, storage, UC, conferencing, and other popular applications is changing WAN requirements. The new WAN must be able to connect any user to any application reliability, securely, and with near real-time response (low latency). Network intelligence based in the cloud enables IT organizations to quickly, easily, and securely adapt their network to the new multi-cloud-oriented traffic flows. It provides the ability to leverage the advantages of Internet connectivity (high speed, low cost, wide availability) while minimizing the disadvantages (unpredictable reliability, poor latency, and limited security).

SD-WAN provides new features that better handle changing network traffic patterns resulting from cloud computing and provides a dramatically simplified way of deploying and managing remote branch office connectivity in a cost-effective manner. SD-WAN eliminates the backhaul penalties of traditional MPLS networks and leverages the Internet to provide secure, high performance connections from the branch to cloud. With SD-WAN, remote users will see significant improvements in their experience when using cloud and SaaS-based applications.

SD WAN is currently in use of a number of interesting use cases, including:

- Hybrid WAN (MPLS and Internet)
- Internet-only WAN
- Unified communication/video quality over the top of Internet
- Temporary, secure WAN access

SD-WAN helps IT organizations deliver a better WAN experience in several ways, depending on the needs of the customer, including a) transition from MPLS only networks to hybrid WAN while leveraging Internet economics, b) replacing MPLS entirely with SD-WAN, c) augmenting existing connections or offering new ones such as LTE and satellite when traditional connectivity is not available. Organizations with a distributed workforce which access cloud-based applications should consider the adoption of cloud-

based SD-WAN solutions. These solutions should have powerful integrated security capabilities and a well-developed security partner ecosystem.

## Meet the Author

*Lee Doyle is Principal Analyst at Doyle Research, providing client focused targeted analysis on the Evolution of Intelligent Networks. He has over 25 years' experience analyzing the IT, network, and telecom markets. Lee has written extensively on such topics as SDN, NFV, enterprise adoption of networking technologies, and IT-Telecom convergence. Before founding Doyle Research, Lee was Group VP for Network, Telecom, and Security research at IDC. Lee contributes to such industry periodicals as Network World and Tech Target. Lee holds a B.A. in Economics from Williams College.*