



I D C T E C H N O L O G Y S P O T L I G H T

SD-WAN: A Critical Step in Transforming the Network for the Cloud Era

April 2017

Sponsored by **GTT**

As the cloud era prevails in enterprise application delivery, software-defined WAN (SD-WAN) is emerging as an important vehicle for application performance and efficiency. SD-WAN allows users in a distributed enterprise to experience optimal performance, security, reliability, and availability for an on-premises datacenter and in cloud-based applications. It helps the enterprise achieve greater efficiency by integrating cheaper bandwidth with traditional MPLS connections, improving bandwidth utilization, and routing traffic dynamically across the most efficient connection. As enterprises embrace SD-WAN to address today's application requirements, they should look ahead to new virtual network services to further simplify, secure, automate, and optimize application delivery across the broader network. Enterprises without the luxury of a deep IT bench should consider a service provider with a managed SD-WAN offering and, more importantly, choose a partner with a vision of SD-WAN as a foundation for delivering a broad portfolio of virtual network services to transform the network for the cloud era. This paper examines the emergence of SD-WAN within the context of this journey. It also looks at the role of cloud networking service provider GTT in this evolution.

Introduction

Enterprise applications are undergoing a significant shift to the cloud. Increasingly, applications are being delivered from the internet via software as a service (SaaS), infrastructure as a service (IaaS), or platform as a service (PaaS). A growing percentage of the workforce is mobile or remote and dependent on accessing applications in the cloud via a mobile device. The internet of things (IoT) will add an exponentially higher number of distributed connections to the enterprise network. A highly distributed enterprise connecting humans and machines to cloud-based applications with a never-ending appetite for bandwidth characterizes the enterprise network of the future.

As enterprise applications continue to rapidly move to the cloud, and as enterprise users become mobile and demand anytime/anywhere access to applications, it is apparent that the WAN needs to evolve to support new application requirements. Irrespective of how users are connected, they expect mobile-friendly applications to be delivered with a consistent level of performance, security, reliability, and availability. Enterprise network traffic growth continues unabated as more business processes are digitized and more applications are accessed remotely. The challenge for enterprises and their service provider partners is to deliver the higher quantum of network traffic while satisfying policy and user experience expectations for new cloud/mobile applications without substantially increasing the cost of the network infrastructure. A hybrid WAN that incorporates all possible WAN connectivity options is not a luxury but a necessity, creating an opportunity for optimizing application performance and improving efficiencies.

SD-WAN enables enterprises to deliver an automated, application-optimized, and integrated hybrid WAN. This presents a solution to the rapid shift in application and WAN traffic characteristics and an opportunity to rationalize network costs in the face of rapidly growing data traffic.

What Is SD-WAN?

SD-WAN incorporates automated software intelligence and a hybrid WAN. Hybrid WAN leverages two or more different network connectivity options (MPLS, broadband internet, 3G/4G, etc.) from each connected site.

- SD-WAN leverages hybrid WAN in an active/active configuration. A typical deployment includes:
 - A centralized, application-based policy controller
 - Analytics for application and network visibility
 - A secure software overlay that abstracts underlying networks
 - An SD-WAN gateway that supports routing interoperability with non-SD-WAN-enabled locations
- Technically speaking, the SD-WAN solution provides dynamic application policy and traffic management by leveraging a central controller. This enables it to deliver:
 - Application-defined intelligent path selection across WAN links (MPLS, broadband internet, LTE, etc.) based on policies defined on the SD-WAN controller
 - Flexible and agile policy definition across all dimensions (security, performance, class of service [CoS], reliability, availability) for all applications

Key Use Cases and Associated Benefits of SD-WAN

SD-WAN helps an enterprise achieve dynamic alignment between business strategy, application policy, and WAN configuration. Key use cases of the technology and associated benefits of this alignment include:

- **Dynamic optimization of WAN costs.** As applications move to the cloud, all branch traffic need not be backhauled to headquarters. With SD-WAN, non-mission-critical application flows can be routed over cheaper broadband internet straight to the cloud by leveraging application-aware intelligent routing across all WAN links. This allows cost-effective alignment of bandwidth with application criticality. Enterprises have the flexibility of choosing the right WAN link for each application and thus dynamically adding or changing bandwidth available for each application. The net effect is that WAN operating costs are substantially lower because bandwidth requirements are minimized and cheaper connectivity options such as broadband internet are leveraged along with traditional WAN links such as MPLS while ensuring appropriate security, reliability, and performance for all applications.
- **Improved branch IT agility and efficiency through automated and agile service provisioning and reduced complexity.** Centralized provisioning of WAN connectivity options per application per site ensures centralized automation and optimization of traffic flows across WAN links. Moreover, it reduces the dependence on local IT resources at the branch to ensure a good application experience for users at the branch. The central provisioning also reduces the complexity in managing network equipment and functions at the branch.
- **Enhanced data security for all applications, especially those hosted in the cloud.** While traditional WAN connectivity options guarantee the reliability and security of data traffic, routing the application flows over cheaper connectivity options such as broadband internet or LTE does not offer the same assurance. SD-WAN solutions that leverage integrated security features such as network address translation (NAT), IPSec-based tunnel overlays, or firewalls enhance data security for applications connecting to the cloud.

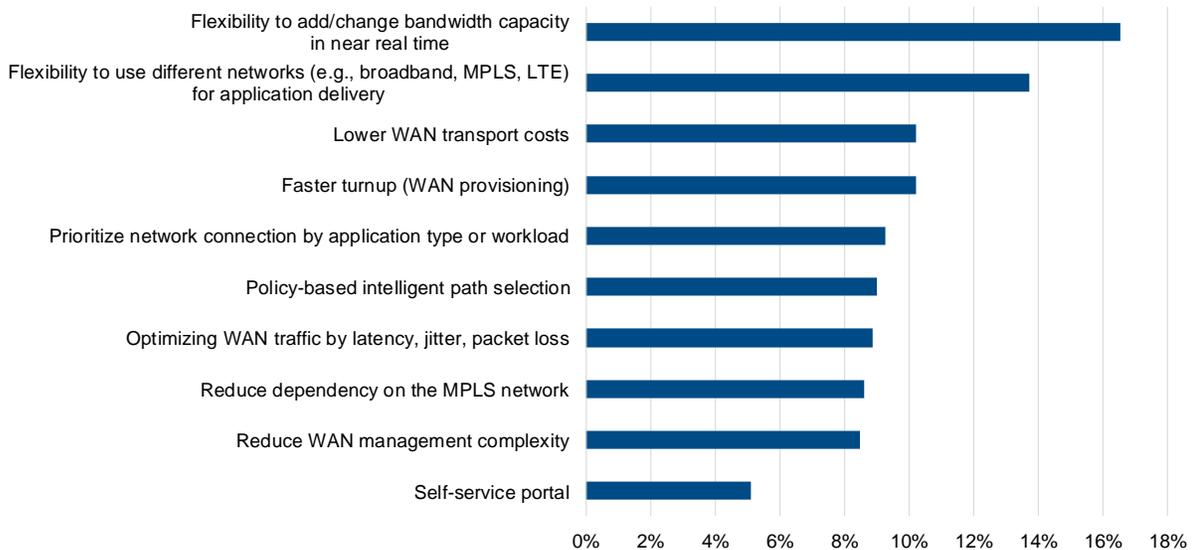
- **Superior customer engagement (application reliability, availability, performance, security, etc.).** If SD-WAN is all about enabling the cost-effective delivery of cloud applications to users, it is important that the technology drive superior customer engagement. By enhancing cloud application reliability, availability, performance, and security, SD-WAN enables an improved user experience and hence drives superior customer engagement and enhanced workforce productivity for the enterprise.

We note that these use cases and associated benefits become more potent as an enterprise begins to leverage more virtual network services and functions hosted on a common multitenant infrastructure at the branch. Figure 1 illustrates enterprise priorities for SD-WAN use cases per IDC's most recent *U.S. Enterprise Communications Survey*.

FIGURE 1

Key SD-WAN Use Cases

Q. Which of the following attributes of an SD-WAN service or solution are the most important considerations when choosing an SD-WAN solution for branch office connectivity?



n = 744

Base = respondents who indicated that their organization plans to migrate existing WAN/network connections to an SD-WAN alternative within two or more years

Source: IDC's *U.S. Enterprise Communications Survey*, December 2015

Limitations of SD-WAN

While the benefits of SD-WAN are quite compelling, IDC anticipates that some unreasonable expectations may have set in given the hype surrounding the technology:

- **Path selection yes, quality of service (QoS) no.** Dynamic, intelligent path selection for specific application flows across WAN links is a key use case for the technology. However, if several applications are leveraging a WAN connection type such as MPLS or Ethernet, SD-WAN by itself does not enable QoS for specific applications. Hence, applications could still experience customary latency or jitter while using SD-WAN depending on the WAN link chosen.

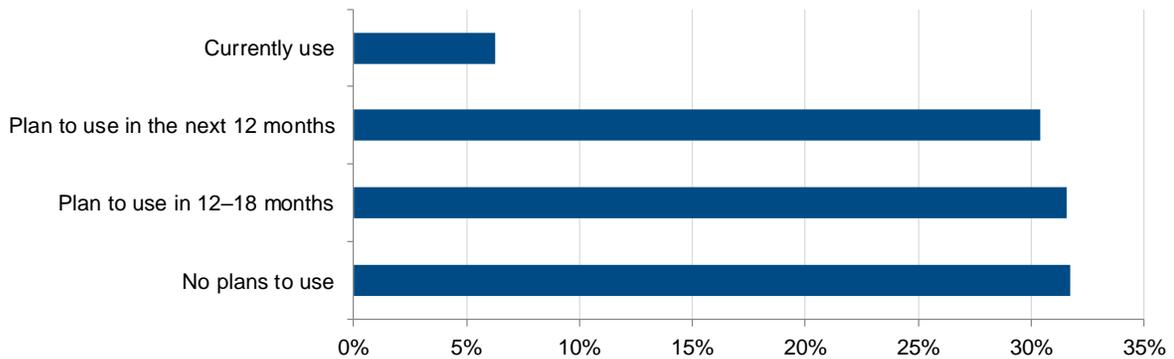
- **Software defined but needs hardware.** SD-WAN clearly simplifies branch IT, but hosting SD-WAN onsite requires some customer premises equipment (CPE). It could be hosted on an on-premises router or an x86 server depending on the customer's situation and hence could add some complexity, especially where a deployment leads to the addition of new hardware.
- **Visibility, intelligence, and management across the WAN, not the entire network.** Centralized control and global network visibility across the WAN are key features of SD-WAN. However, achieving the same benefits across the entire network will require other orchestration solutions based on software-defined networking (SDN) as an overlay across the broader network.
- **Nontraditional WAN connections may not necessarily be very cheap.** Broadband internet is often touted as a cheaper WAN connection type. However, local broadband pricing in international markets may not always offer a significant cost advantage.

Despite the limitations of the technology, the clear benefits of the solution are driving strong momentum in the market. As suggested by IDC's 2016 *Software-Defined WAN (SD-WAN) Survey*, a growing number of enterprises are prepared to consider SD-WAN alternatives and will be prepared to purchase services or solutions from vendors in the next one to two years. As Figure 2 illustrates, 70% of enterprises plan to use SD-WAN in the next 18 months.

FIGURE 2

Current and Planned Use of SD-WAN

Q. Does your organization currently use or plan to use SD-WAN?



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

According to IDC, four categories of products and services form the SD-WAN market landscape: WAN infrastructure (routing and WAN optimization), SD-WAN control and overlay (SD-WAN application-based policy controllers and overlays and related analytics), communication service provider (CSP) SD-WAN managed services, and cloud-managed SD-WAN services, which can be provided by SD-WAN vendors, over-the-top (OTT) cloud service providers, or managed service providers (MSPs).

IDC forecasts that the worldwide SD-WAN market for infrastructure and services will exceed \$6 billion in 2020 and that the 2015–2020 compound annual growth rate (CAGR) for SD-WAN will be 93%.

Among the four segments that make up the total SD-WAN market, growth will be strongest for CSP SD-WAN managed services, which is expected to grow at a CAGR of 212.8% and reach a total value of \$2.2 billion in 2020. IDC sees several drivers for this significant growth of CSP SD-WAN managed services in the future:

- The flexibility of a pay-as-you-go network-as-a-service model
- The efficiency/lower capex/opex entailed in an outsourced model versus a do-it-yourself model
- The paucity of technical talent and expertise required to implement and operate any software-defined solution including SD-WAN
- The ability to ensure appropriate levels of application performance, reliability, and security of the solution via specific service-level agreements (SLAs) with the service provider
- The potential to receive an integrated managed hybrid SD-WAN offering with one throat to choke on service quality

IDC views this last point as a very critical consideration for an enterprise faced with a plethora of managed SD-WAN offerings from CSPs in the market. Choosing a specific CSP solution from among the many offerings, one that integrates the SD-WAN overlay technology with appropriate connectivity/transport options and the optimal network architecture, is critical to the enterprise's ability to harvest the promise of technology.

Considering GTT's SD-WAN Solution

This section discusses cloud networking service provider GTT's SD-WAN offering and the company's longer-term product vision. GTT is uniquely positioned to deliver SD-WAN service with a tier 1 IP network ranked in the top 5 in the world, extensive connectivity to leading cloud service providers across 300+ global points of presence, and a broad portfolio of diverse last mile connectivity options to any location in the world. The service provider has responded to the emerging application and WAN paradigm, launching a managed SD-WAN service that builds on the company's proven track record of providing hybrid WAN. GTT's SD-WAN service leverages technology from SD-WAN vendor VeloCloud.

GTT's Managed SD-WAN strategy has the following key elements:

- Provides a unified managed network experience, leveraging GTT's expertise in enterprise wide area networking across myriad geographies and vertical markets
- Leverages GTT's deep knowledge of vertical-specific applications in retail, financial services, technology, and media and entertainment
- Enables secure direct network connectivity to the cloud for branch users leveraging both broadband internet and GTT's EtherCloud WAN services
- Reinforces the attributes of the client experience centered on simplicity, speed, and agility
- Is being deployed as part of a comprehensive road map strategy that consists of SDN and virtual CPE services offerings that complement and enhance the core SD-WAN solution
- Capitalizes on the technology advantage of SD-WAN vendors

GTT's Managed SD-WAN builds on a foundation of network intelligence and agility, with the ability to cost effectively connect customers to any location in the world and any application in the cloud. Unique features of the Managed SD-WAN service include:

- **Hybrid networking.** GTT's Managed SD-WAN solution integrates the public internet with GTT's private WAN service, EtherCloud, to create a true integrated and automated hybrid WAN and enables customers to dynamically connect to the cloud via the internet or to applications hosted in the central datacenter via MPLS. GTT can provide connectivity directly to the cloud or via cloud exchanges. GTT's Managed SD-WAN service can be flexibly deployed across disparate network technologies — Ethernet, MPLS, broadband, LTE — over the GTT network or an alternative network, or a hybrid of the two.
- **Ability to use all available bandwidth, including the secure internet.** Centralized visibility, control, and application flow management across broadband and MPLS connections also optimize bandwidth utilization and network operations costs.
- **Application awareness, visibility, and performance.** GTT's Managed SD-WAN solution monitors the hybrid WAN in real time and provides granular network intelligence to the central controller. The controller leverages this intelligence to provide intelligent path selection for application flows based on policy defined for each application. This enables the appropriate level of performance for each application in the network. Minimum performance benchmarks can be set on a per-application basis and can be adjusted automatically. The service allows the customer to continuously monitor and improve network paths based on the intelligence.
- **Network reliability and resiliency improvements with minimal cost.** Real-time analytics allow for policy creation and troubleshooting and provide insights into application utilization and bandwidth consumption, which ultimately impacts the reliability of nontraditional WAN links and overall resiliency and efficiency of the WAN.
- **Ability to virtualize branch equipment, providing cost savings.** The Managed SD-WAN solution is the first of many branch network functions that a customer can virtualize and host on general-purpose servers in a virtual CPE context. The ability to reduce the hardware footprint and host all network functions on commodity servers makes for a less expensive equipment footprint.

GTT's Managed SD-WAN solution is the first of a number of virtual network services the MSP plans to bring to market over the next 24 months. Its goal is to offer a broad set of agile, efficient, and flexible services to its distributed enterprise installed base. As such, GTT is executing on a road map of comprehensive SDN and virtual network service offerings to complement and enhance its core SD-WAN solution. Next on the road map is an SDN-based "Bandwidth on Demand" offering to be launched in late 2017. This will enable GTT's clients to dynamically provision network bandwidth on demand, including provisioning new connections to the cloud in an agile fashion.

GTT also plans to offer a comprehensive set of virtual network services leveraging virtual network functions (VNFs) such as managed router and firewall — all deployed as virtual CPE at the branch. The launch of these services will enable GTT's Managed Services customers to provision a comprehensive set of new virtual network services in real time.

Selecting the Right SD-WAN Service to Meet Your Requirements

Despite a few limitations of SD-WAN technology, the clear benefits of the solution are driving strong momentum in the market. SD-WAN helps an enterprise achieve dynamic alignment between business strategy, application policy, and WAN configuration. As suggested by IDC's 2016 *Software-Defined WAN (SD-WAN) Survey*, a growing number of enterprises are prepared to consider SD-WAN alternatives and 70% will be prepared to purchase services or solutions from vendors in the next one to two years.

As stated previously, the market for SD-WAN managed services is expected to grow exponentially. In IDC's view, key drivers of this surge are the flexibility, operational efficiency, and lower capex entailed in a network-as-a-service offering, as well as the paucity of technical talent and expertise necessary to deploy any SDN solution such as SD-WAN.

It is important that enterprises carefully evaluate the many CSP managed services offerings that have come to market recently. A CSP solution that can integrate the SD-WAN overlay technology with appropriate connectivity/transport options and the optimal network architecture is critical to the enterprise's ability to harvest the promise of technology and achieve the desired alignment.

IDC believes that as enterprises embrace SD-WAN to address today's application requirements, they must look ahead at the potential of intelligent SDN solutions such as virtual network services to further simplify, secure, enhance, and optimize application delivery across the broader network. Enterprises without the luxury of a deep IT bench at each branch location should consider a service provider with an SD-WAN offering but more importantly with a long-term vision to aid the transformation of the network for the cloud era.

GTT is executing on a comprehensive road map of SDN solutions designed to transform its customers' networks for the cloud era. The provider's road map of proposed product offerings reflects an understanding of customer demands today and what the eventual needs will likely be once the initial benefits from the first of its virtual network service offerings — SD-WAN — are realized. To the extent that GTT can execute on its SDN road map, bring this promised offering to market on time, and continue to deliver on its core service values of simplicity, speed, and agility, IDC believes it is an attractive service provider option for enterprises that are seeking to reap the benefits of SD-WAN and SDN technology.

Conclusion

The cloud is changing how applications are consumed and delivered in the enterprise. In distributed enterprises, the cloud is rendering the old datacenter-focused WAN design obsolete and necessitating a rethink in terms of how the WAN is configured and architected. The challenge for enterprises and their service provider partners is to deliver a higher quantum of network traffic to users while satisfying application policy and user experience expectations for new cloud/mobile applications without breaking the bank. A hybrid WAN that incorporates all possible WAN connectivity options is not a luxury but a necessity. SD-WAN enables the distributed enterprise to deliver an automated, application-optimized, and integrated hybrid WAN as a solution to the rapid shift in application and WAN traffic profiles and an opportunity to rationalize network costs in the face of rapidly growing data traffic. It is no surprise that SD-WAN and SDN are commanding the focus of many enterprise CIOs given the IT challenges and opportunities in today's cloud era. Selecting the right service provider partner is the first important step toward implementing an effective SD-WAN and SDN strategy.

ABOUT THIS PUBLICATION

This publication was produced by IDC Custom Solutions. The opinion, analysis, and research results presented herein are drawn from more detailed research and analysis independently conducted and published by IDC, unless specific vendor sponsorship is noted. IDC Custom Solutions makes IDC content available in a wide range of formats for distribution by various companies. A license to distribute IDC content does not imply endorsement of or opinion about the licensee.

COPYRIGHT AND RESTRICTIONS

Any IDC information or reference to IDC that is to be used in advertising, press releases, or promotional materials requires prior written approval from IDC. For permission requests, contact the IDC Custom Solutions information line at 508-988-7610 or gms@idc.com. Translation and/or localization of this document require an additional license from IDC.

For more information on IDC, visit www.idc.com. For more information on IDC Custom Solutions, visit http://www.idc.com/prodserv/custom_solutions/index.jsp.

Global Headquarters: 5 Speen Street Framingham, MA 01701 USA P.508.872.8200 F.508.935.4015 www.idc.com