



## White Paper

# SD-WAN: Enhancing the Traditional WAN for the Future

Sponsored by: AT&T

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## IDC OPINION

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As enterprises transform their business processes to embrace greater digitization, cloud and mobility are combining to rapidly shift the application and data traffic profile within the enterprise. More enterprise applications are being delivered from the cloud, and more enterprise users are mobile and require anytime/anywhere access to applications. The network delivering application data to users must evolve. In distributed enterprises, such as those with several branches and remote workers, it is the wide area network (WAN) that requires an urgent transformation.

Software-defined wide area network (SD-WAN) provides a solution to address this paradigm shift in the application and WAN traffic profile and an opportunity to rationalize costs. This white paper examines the many ways SD-WAN enhances traditional multiprotocol label switching (MPLS)-based WAN connectivity and hence adds value to a modern distributed enterprise.

Like with most technologies, there is not a "one size fits all" approach. Considering the usual diversity of business use cases, users, and applications across sites in a distributed enterprise, the applicability and opportunity for SD-WAN also vary within any enterprise. IDC believes that traditional WAN connectivity options such as MPLS and Ethernet are not going away anytime soon and, in certain situations, will likely continue to be the primary connectivity option. However, SD-WAN enhances the appeal of traditional WAN connectivity. Thus MPLS and Ethernet are likely to be integrated with other connectivity options such as broadband internet and Long-Term Evolution (LTE), with all connectivity options optimized and automated for application policy. This white paper also reiterates IDC's guidance for selecting an SD-WAN carrier partner.

Further, this white paper reviews AT&T's strategy in offering SD-WAN services and how the company's offering complements its MPLS virtual private network (VPN) service by offering customers more choice in addressing site-specific application requirements.

## SITUATION OVERVIEW

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### The Digital Transformation Imperative for the Enterprise

IDC defines digital transformation (DX) as the process of creating value, growth, and competitive advantage through new digital offerings, business models, and business relationships. Enterprises across the world are embracing digitization of their business processes, enabling the capturing of more data across all functions. This data is in turn used to optimize operations and customer engagement. Increasingly, it is becoming evident that this is not a choice for enterprises but rather an imperative to

survive and thrive as customers come to expect the superior outcomes brought forth from their vendors' and suppliers' DX strategies. As enterprises worldwide, across all geographies and vertical markets, recognize that embracing DX leads to improved efficiency, new revenue streams, and better customer engagement and experience, they have made DX an urgent priority. They realize that organizations that fail to embrace and execute on digital transformation risk dire consequences, including long-term business irrelevance.

## Applications Are Shifting to the Cloud

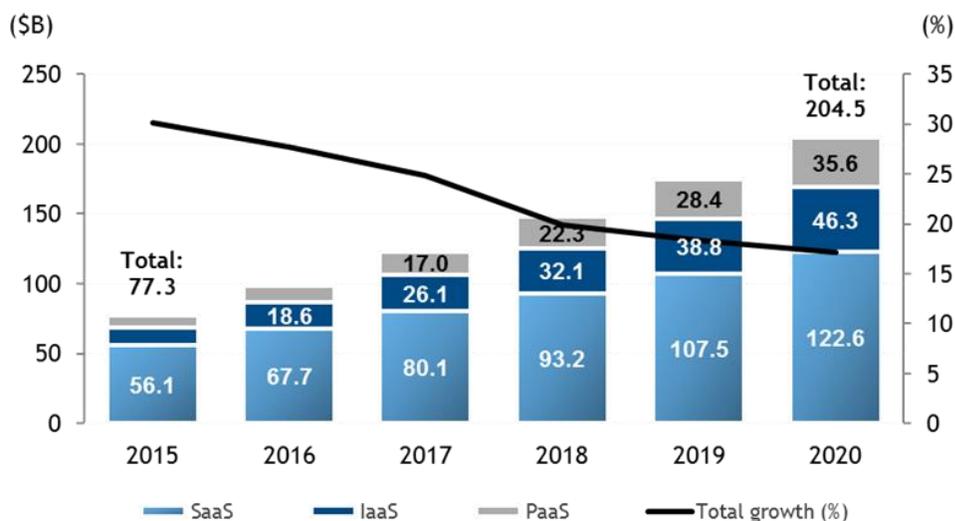
Cloud computing is a key pillar at the forefront of the enterprise's drive toward DX. Cloud is often the starting point in the process of creating a digital business. Accessing applications and data from the cloud provides enterprises with the requisite flexibility, agility, and efficiency to enable digitization without the typical up-front capital investment. A digital initiative requires more computing horsepower – an enterprise can rent more over the cloud and dial it down when not required. Hence increasingly applications are being delivered from the cloud in its various forms – software as a service (SaaS), infrastructure as a service (IaaS), or platform as a service (PaaS).

IDC believes that the rising tide of DX business initiatives born from CEO-level priorities is driving a rapid rise in IT spending on big data and analytics, mobile, social, Internet of Things (IoT), and cognitive/AI technologies to support DX initiatives. At scale, virtually none of these technologies are possible without cloud as the foundation.

IDC forecasts that public IT cloud services revenue will grow at a compound annual growth rate (CAGR) of 21.5% through 2020 and will exceed \$204.5 billion in 2020 (see Figure 1). This growth rate is almost seven times the rate of overall IT market growth. In 2020, public IT cloud services will drive 58% of the \$355 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.

**FIGURE 1**

### Worldwide Public IT Cloud Services Revenue Growth



Source: IDC's *Worldwide and Regional Public IT Cloud Services Forecast, 2016 - 2020* (IDC #US40739016, December 2016)

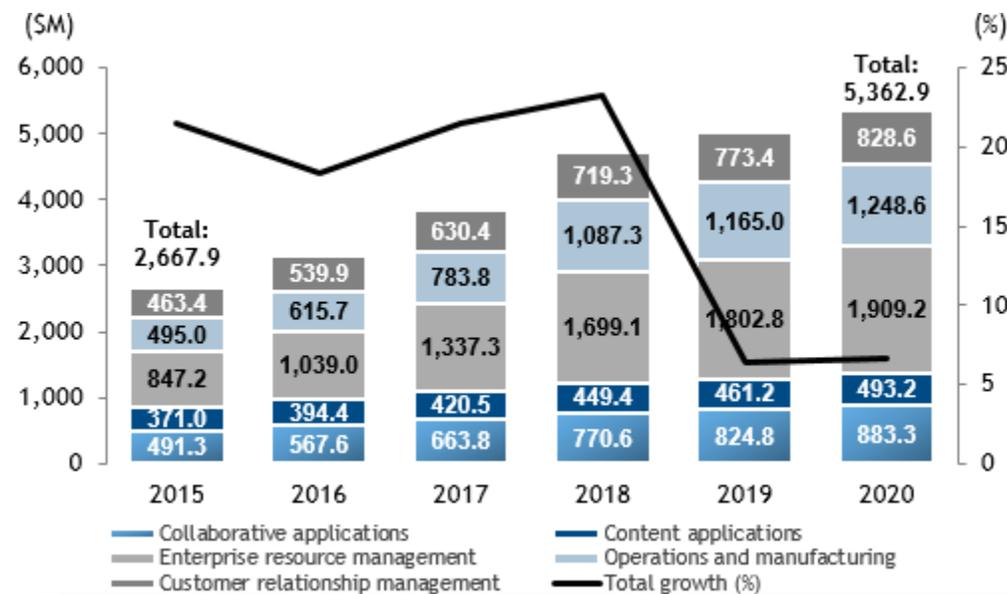
## Enterprise Users Are Increasingly Mobile

Over the past decade, there has been a massive growth in the numbers of mobile applications for enterprises as well as in the number of users relying on these mobile applications to get work done. Providing enterprise application customers with anytime, anywhere, and any device access to core enterprise data, as well as the ability to interact with this data to get work done, has become a key strategic imperative for enterprise application vendors.

Importantly, cloud applications were the first software designed for the mobile-first era, and hence it is not surprising that most enterprise applications in the cloud are accessed on mobile devices. As more enterprise applications move to the cloud, more enterprise data will need to be delivered to mobile devices under an anywhere-anytime access paradigm. Indeed, in *Worldwide Mobile Enterprise Applications Forecast, 2016-2020: Mobile First, Mobile Only, Mobile Also* (IDC #US40753716, September 2016), IDC forecasts mobile enterprise applications to grow at a strong 15.2% CAGR by 2020 (see Figure 2).

FIGURE 2

### Worldwide Mobile Enterprise Applications Revenue Growth



Source: IDC's *Worldwide Mobile Enterprise Applications Forecast, 2016 -2020: Mobile First, Mobile Only, Mobile Also* (IDC #US40753716, September 2016)

## The Application Access Network Must Evolve

As enterprise applications continue to migrate to the cloud and as users become more mobile and bring more devices onto the network, the WAN serving distributed enterprises needs to evolve to support these heightened application requirements. The WAN needs to address new application-specific requirements such as performance, security, reliability, and availability for the new generation

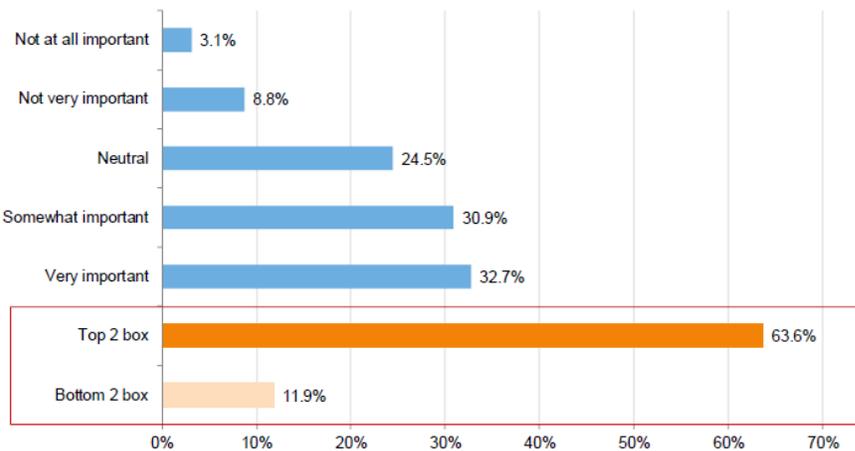
of mobile cloud apps. Greater digitization of business processes and increased reliance upon cloud computing also implies that there will be more network traffic across all parts of the enterprise network, including the WAN. The challenge for the enterprise and their carrier partners is to deliver the higher quantum of network traffic while satisfying application policy requirements without breaking the bank. The future of the digital enterprise rests on addressing this challenge effectively in the near future. It is increasingly critical that the WAN architecture evolves to serve the emerging application access requirements.

IDC's surveys indicate that cloud initiatives are driving a thorough reconsideration of WAN architectures and strategies. IDC's April 2016 *SD-WAN Survey* suggested 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. 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. Further, the importance of cloud applications 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 *SD-WAN Survey* indicated that cloud services will be very important to their organizations' WAN technology choices and planning in the next 12-24 months (see Figure 3).

**FIGURE 3**

### WAN Technology Choice Increasingly Driven by Cloud Applications

*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

Source: IDC's *SD-WAN Survey*, April 2016

### WHAT IS SD-WAN?

SD-WAN has emerged as a solution to address this paradigm shift in application and WAN traffic profile and to rationalize network traffic costs. SD-WAN and the associated concept of hybrid WAN

make the challenges of digital transformation manageable on the enterprise network. As per IDC's definition, a hybrid WAN includes at least two WAN connections from each branch office and leverages two or more different network connectivity options (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
- An SD-WAN forwarder (routing capability)

Technically speaking, the SD-WAN solution promises the enablement of:

- 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, COS, reliability, availability) for all apps
- Dynamic application policy and traffic management leveraging the central controller

## KEY BUSINESS BENEFITS OF A GENERIC SD-WAN SOLUTION

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SD-WAN essentially helps an enterprise achieve dynamic alignment between business strategy, application policy, and the enterprise's wide area network configuration. The key benefits of this alignment across business, application, and network policy are:

- **Optimization of modern application delivery costs** through the WAN in the face of future application traffic profile change and growth. As more applications move to the cloud, WAN traffic flows can, for instance, be redefined to reduce backhaul of cloud-destined application traffic to headquarters from the branch, thus reducing WAN bandwidth capacity requirements. Similarly, non-mission-critical application flows can be routed over cheaper broadband internet straight to the cloud via application-defined intelligent path selection across all WAN links.
- **Greater flexibility and efficiency of network transport** via cost-effective alignment of network connectivity options and 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. Similarly, depending on application-specific policy defined on the central SD-WAN controller, application flows can be routed over the most cost-effective connectivity option while ensuring application-specific performance (latency, jitter) requirements are met.
- **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 across all traffic flows across WAN links and reduces the dependence on local IT resources at the branch to ensure a good application experience to users at the branch. The central provisioning also reduces the complexity of management of network equipment and functions at the branch.
- **Secure data traffic** for all applications especially those hosted in the cloud. While traditional WAN connectivity options such as MPLS VPN guarantee 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 with integrated security features

such as Network Address Translation (NAT), IPSec, or firewalls enhance data security for applications connecting directly to the cloud.

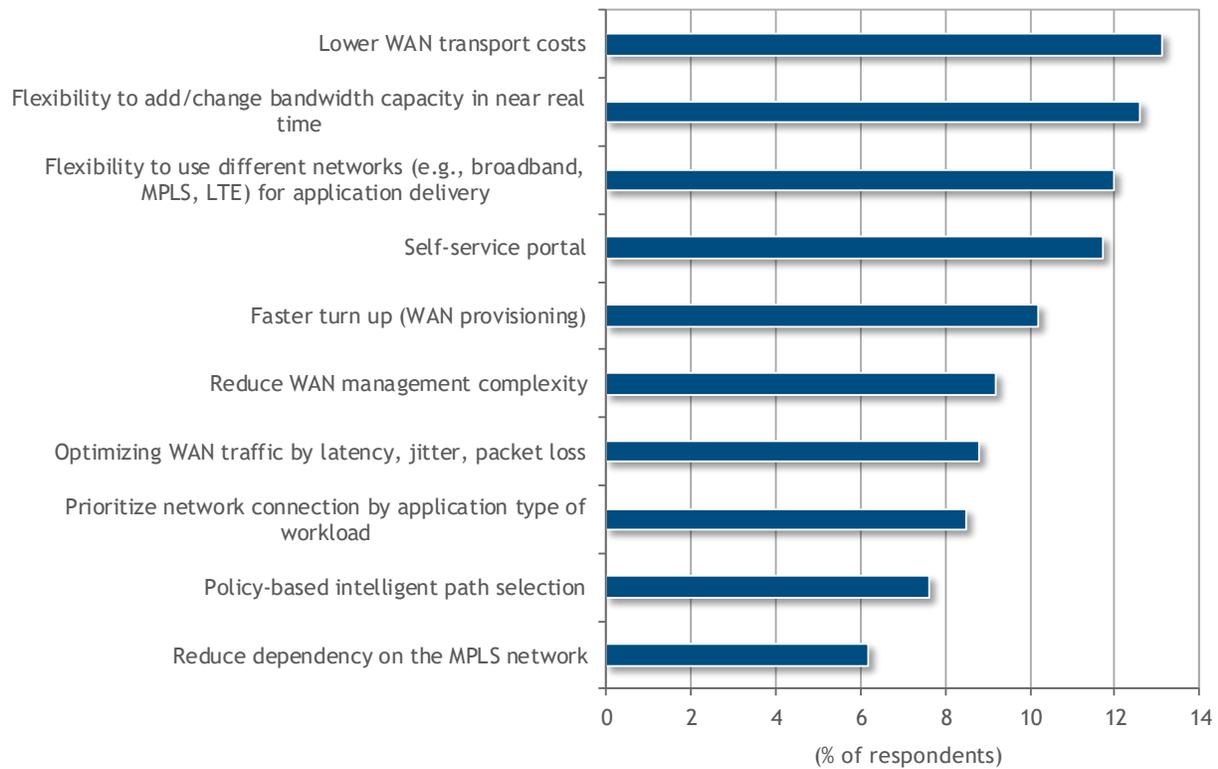
- **Superior customer engagement** (app reliability, availability, performance, security, et al.). If SD-WAN is about enabling the cost-effective delivery of cloud applications to users in the pursuit of mission-critical DX initiatives, it is important that the technology drive superior customer engagement. By enhancing cloud application reliability, availability, performance, and security, SD-WAN enables an improved application user experience and hence drives superior customer engagement for the enterprise.

These expected benefits were confirmed by the results of IDC's *U.S. Enterprise Communications Survey* published in March 2017 (see Figure 4). Interestingly, "reducing dependency on the MPLS network" was the lowest in priority in perceived benefits of an SD-WAN solution.

**FIGURE 4**

**Key SD-WAN Customer Priorities**

*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? (Rank #1)*



n = 772

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

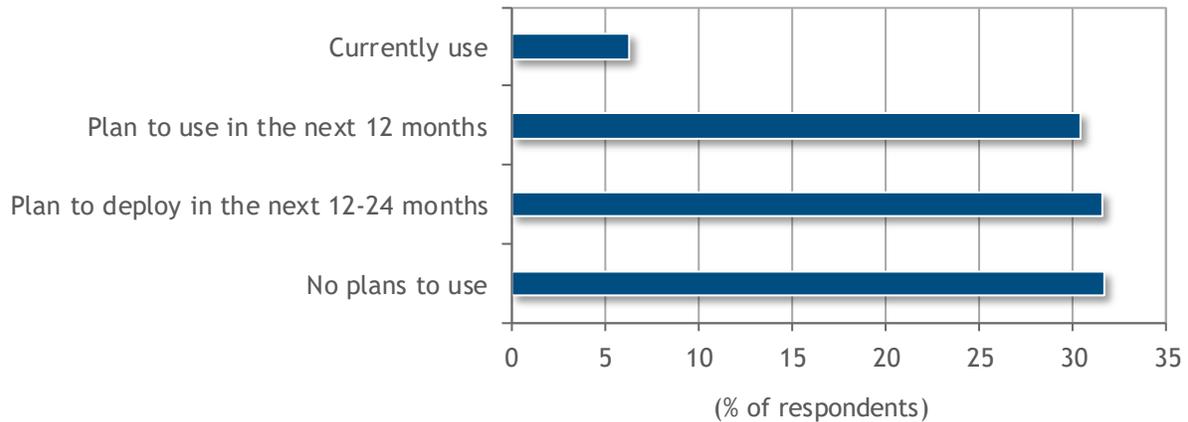
Source: IDC's *U.S. Enterprise Communications Survey*, March 2017

IDC surveys also suggest that the positive perception of the benefits of the technology is translating to interest in its adoption. As suggested by IDC's 2016 *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. Per the survey results, 70% of enterprises plan to use SD-WAN in the next 18 months (see Figure 5).

**FIGURE 5**

**Migration Plans to SD-WAN**

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



n = 605

Source: IDC's *SD-WAN Survey*, April 2016

IDC sees four categories of products and services that 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 SDWAN services, which can be provided by SD-WAN vendors, OTT cloud service providers, or managed service providers (MSPs). IDC has forecast that the worldwide SD-WAN market for infrastructure and services will exceed \$6 billion in 2020. For the 2015-2020 period, IDC estimates that the CAGR for SD-WAN will be 93%.

Among the four SD-WAN market segments discussed previously, growth will be strongest for carrier or CSP SD-WAN managed services, with the category expected to grow at a CAGR of 211.8%, reaching a total value of \$2.2 billion in 2020.

**IDC GUIDANCE FOR SELECTING AN SD-WAN CARRIER PARTNER**

IDC considers the following carrier attributes as key evaluation criteria for enterprises evaluating SD-WAN carrier partners:

- **Network coverage:** The first factor that an enterprise must investigate while choosing an SD-WAN carrier partner is whether the potential SD-WAN partner offers network coverage in the geographies that the enterprise operates branch offices and datacenters in. Considering

secure cloud connectivity is a key requirement of SD-WAN, it is also important to evaluate if the partner has the presence to connect all branch offices to the specific clouds that the enterprise connects to for its various applications.

- **Breadth of portfolio:** Another key criterion for enterprises to evaluate is the breadth of the services portfolio being offered by the carrier partner. While it is understood that SD-WAN is a transport overlay service running on top of various transport options such as MPLS, Ethernet, broadband internet, or LTE, the ability of a carrier partner to offer one or many transport options in addition to the SD-WAN and cloud connectivity services allows an enterprise to potentially receive beneficial pricing for bundled services and have one throat to choke for support. Also, important in this regard is the partner's ability to provide the appropriate monitoring and management tools for enterprise personnel to have the necessary visibility and control of the service.
- **Service architecture:** It is also important for the enterprise to evaluate the partner's product or service architecture and its ability to scale and provide the necessary flexibility and agility of service at an acceptable cost.
- **Technology expertise and road map:** Telecom infrastructure today is fast evolving, with innovation constantly being brought to the market by service providers and technology vendors alike. It is important for an enterprise to evaluate the technology expertise of the partner and its ability to bring innovation faster to the market than others. It is also important to understand the vision of the partner in terms of future network edge services that the partner plans to bring to the market and how that expanded product and services road map may benefit the enterprise in terms of lower costs, greater flexibility and agility, and improved service performance.
- **Service excellence:** It is also important for the enterprise to take the service providers track record of service excellence into account. The ability of the service provider to design comprehensive SLAs and deliver on them in a reliable and predictable fashion is always going to be a very important criterion in choosing a partner. The support capabilities of the partner in terms of responsiveness to remote site connectivity or application networking issues are critical to the long-term customer satisfaction of the enterprise.

## AT&T'S STRATEGIC APPROACH TO SD-WAN

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AT&T, in keeping with its stature as a leading global service provider, has been very aggressive in its approach to transforming its network to a software-defined, agile, and flexible architecture via its well-publicized Domain 2.0 initiative. It was the first to launch on-demand agile services such as its Network on Demand capability while providing enterprise customers vast network coverage spanning 160 countries that include MPLS VPN and Ethernet.

In keeping with its technology leadership across all service domains, AT&T has also embarked on an aggressive road map to offer its customers an enhanced portfolio of WAN services including SD-WAN. IDC sees the approach driven by the following three strategic underpinnings:

- **Offer enterprise customers more choice by expanding the portfolio beyond MPLS.** AT&T recognizes that application and associated data traffic has changed significantly with the advent of the cloud and so have the enterprise customer's expectations of the WAN. Enterprises desire to use more broadband for their WAN needs for improved speed and reduced cost and to connect to applications hosted in the cloud. Customers increasingly expect to use a combination of connectivity options in a hybrid WAN configuration. AT&T's first

strategic response to evolving customer needs is to expand the company's WAN services portfolio beyond MPLS. Its SD-WAN offering intends to accomplish that by enabling dynamic policy routing across two or more WAN links such as MPLS, broadband internet, or LTE in an active-active configuration. Although AT&T has a robust broadband offer, its SD-WAN service does not require AT&T to be the transport service provider. AT&T's endeavor is also to offer intelligent network services as an overlay/over-the-top service to prospects not using AT&T for transport. Bottom line, AT&T wishes to expand customer choice by offering an enhanced, software-driven, and controlled WAN service to its installed base of MPLS customers and by offering a software overlay-based WAN managed service for prospects not currently using it for transport.

- **Enable site-specific optimization based on unique requirements of each site.** This strategic underpinning rests on the principle that like most technologies, one size does not fit all. Considering the usual diversity of business use cases, users, and applications across sites in a distributed enterprise, the applicability and opportunity for SD-WAN also varies within any enterprise. It is here that AT&T believes it can bring its vast portfolio of WAN services to play and mix and match its portfolio with individual site requirements to drive the most optimal outcome for the customer. For instance, AT&T believes a typical enterprise could potentially have the following connectivity combinations including those that leverage SD-WAN.

- MPLS only
- SD-WAN optimized MPLS + LTE
- SD-WAN optimized MPLS + broadband
- SD-WAN optimized dual broadband
- IPSec
- Secure connectivity to cloud via its NetBond cloud connectivity service across all options

The key thought here in IDC's view is that MPLS, given its private network-based deterministic and secure performance capabilities, is unlikely to be supplanted by cheaper connectivity options especially for mission-critical applications. However, SD-WAN with its dynamic application policy-based routing capabilities allows enterprises to drive a more efficient site-specific outcome for the WAN while more effectively addressing the requirements of mission-critical and cloud applications. AT&T believes its complete portfolio of WAN services including MPLS VPN, AT&T Multiservice VPN based on its AT&T Network-Based IP VPN Remote Access (ANIRA), and its SD-WAN service for hybrid WANs can together address all site-specific WAN connectivity options.

- **Leverage network integration capabilities across access options – IPSec, MPLS, and hybrid.** AT&T recognizes that given its reach, size, and scale, its network integration capabilities – now enhanced further by its SD-WAN solution – are unmatched. Hence its ability to offer optimal solutions for its enterprise customers sites by providing integration, automation, and application policy-based optimizations in any hybrid WAN configuration via its network-based SD-WAN services is likely to be very compelling to customers.

## Value Proposition of AT&T's SD-WAN Offering

AT&T believes its SD-WAN offering provides the following compelling differences to its customers vis-à-vis other managed service providers:

- Its SD-WAN service achieves intelligent dynamic routing using smart VNFs integrated with its transport network as opposed to CPE-based SD-WAN, which uses the network only for connectivity.
- It has the ability to mix and match SD-WAN sites with MPLS-only sites and drive the most optimal site-specific outcome.
- Later this year (July 2017), AT&T's network-based SD-WAN service will offer inherent redundancy with multiple hybrid gateways located in AT&T Integrated Cloud nodes.
- The network offers an integrated customer experience across CPE and network.
- Its integrated NetBond secure direct cloud connectivity service enables efficient routing to cloud-based applications without the performance and efficiency issues created by the backhauling of cloud traffic over the WAN.
- AT&T believes its cloud-based virtual services architecture for SD-WAN provides superior scalability, performance, and reliability compared with competing solutions.

## CONCLUSION

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As application and associated data traffic evolve for application users in distributed enterprises, so must the WAN. SD-WAN is a technology that has arisen in response to the dramatic move of application traffic to the cloud to address new application requirements and to leverage opportunities for efficiency and improved application policy optimization – spanning performance, security, availability, and reliability. Traditional WAN connectivity options, such as MPLS, are unlikely to be totally supplanted by cheaper connectivity options especially for mission-critical applications, given its private network-based deterministic and secure performance capabilities. However, SD-WAN with its dynamic application policy-based routing capabilities allows enterprises to drive a more efficient site-specific outcome for the WAN while effectively addressing the requirements of mission-critical and cloud applications. AT&T's strategic approach to this network revolution is to offer the company's customers more choice via an enhanced WAN service that can be optimized to site-specific application requirements and can leverage its significant reach, size, and scale for unmatched integration, automation, and application policy-based optimizations in any hybrid WAN configuration. Finally, AT&T believes its cloud-based virtual services architecture for SD-WAN provides superior scalability, performance, and reliability compared with competing solutions.

## About IDC

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