Achieving Agility with Cloud UC

Success Depends on Evolving the Network

For more than 15 years the enterprise WAN has remained largely unchanged: MPLS as the primary means of branch connectivity, higher speed services at the core, and Internet access only through a limited number of centralized access points. As applications and communications shifts to the cloud, networks must change. As a result, SD-WAN and direct cloud connect services are emerging to enable organizations to reduce costs, better support cloud-based applications including Unified Communications as a Service (UCaaS) and improve security and agility.

Compass Direction Points:

- **Applications are rapidly shifting to the cloud:** Enterprise demand for greater agility and the view that cloud is more secure than on-premises are driving increasing cloud application and platform adoption.
- **Revisit the WAN:** Networks optimized for internal data center connectivity don’t cut it in an increasingly PaaS/IaaS/SaaS world.
- **Evaluate emerging SD-WAN options:** Organizations are leveraging SD-WAN to reduce costs, increase resiliency and improve cloud application performance.
- **Direct cloud connect optimizes performance of UCaaS:** Especially for sites where direct Internet access isn’t feasible.

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Executive Summary

Businesses are rapidly moving to the cloud for their communications and collaboration needs, especially when they want to deliver a consistent set of services to staff anywhere in the world without the hassles of maintaining a PBX of their own. Unified Communications as a Service (UCaaS) strives to meet business needs for features and performance, but achieving a successful rollout means providing a network that delivers high availability, high performance, and the ability to proactively address conditions that can hurt cloud communications and collaboration.

Three options are key to re-architecting the WAN in the age of cloud: Software-Defined WAN (SD-WAN), direct cloud connect, and WAN-Cloud Exchanges (WAN-CX). SD-WAN pools branch connectivity and intelligently manages traffic across all available links, increasing resilience and improving performance while reducing management costs. Direct cloud connect bypasses the Internet for communications with a specific cloud service provider by linking the enterprise WAN edge to the cloud provider’s edge directly. WAN-CX uses an exchange approach to direct connection: enterprises connect to an exchange, then spin up virtual links through that connection to any cloud service provider on the exchange.

Connecting enterprise networks to cloud service providers through direct connect, SD-WAN, or WAN exchange services offers the opportunity to guarantee high quality application service delivery as well as to reduce costs by leveraging lower-cost connectivity options, globally.

IT leaders should:
- Reevaluate their wide area network strategy in conjunction with their plans to adopt cloud application and platform services
- Consider the ability of SD-WAN to reduce operating costs, enable greater flexibility, and optimize cloud-based traffic flows
- Evaluate direct cloud connect offerings to join enterprise data networks with cloud-based services to provide predictable performance, resiliency, and end-to-end performance management for cloud-based applications, especially UCaaS
- Enable flexibility to leverage various SD-WAN approaches where it makes sense; avoid being locked into a single, global approach.
The Issue: Business Needs UCaaS, UCaaS Needs More

Businesses are rapidly moving to the cloud for their Unified Communications (UC) and collaboration needs, especially when they want to deliver a consistent set of services to staff anywhere in the world without the hassles of maintaining a UC platform of their own. Leveraging Unified Communications-as-a-Service (UCaaS) enables organizations to rapidly deploy new features and capabilities, and to offload responsibility for security to a software service provider.

UCaaS providers strive to meet business needs for features, reliability, and performance, but achieving a successful rollout means providing a network that is optimized for SaaS, that delivers high availability, high performance, and the ability to proactively address conditions that hurt cloud-based UC and collaboration.

The Shift to the UCaaS

The march to the cloud is moving ahead—and accelerating. Nemertes’ 2016-17 Cloud, Data Center and SD-WAN benchmark and previous studies found that:

- 75% of companies are now using public Infrastructure as a Service
- Nearly half are using Platform-as-a-Service
- SaaS comprises approximately a quarter of the typical enterprise set of applications.

At the same time, nearly 40% of organizations are using or planning to use Unified Communications as a Service to shift their telephony, messaging, and conferencing applications to the cloud. IT leaders cite the agility that cloud offers to support rapidly changing business conditions, and to take advantage of new capabilities as their primary justification for shifting to cloud. Perhaps more importantly, nearly 45% say that they see cloud services as more secure than on-premises platforms thanks to the ability of cloud providers to focus resources on security. (Please see Figure 1.)

Greater reliance the cloud drives the increasingly common need not just for rock-solid reliability and high throughput, but also for application intelligence in the network. An intelligent network preserves—and improves—performance for business-critical applications.

It’s Time For a New WAN

For most of the last decade IT has relied on a three-tier WAN architecture for connecting office locations with applications housed in corporate data centers. (Please see Figure 2.)
This architecture is ill suited to the transition to cloud. Whereas in the past most traffic stayed on the enterprise network, today, thanks to growing adoption of cloud-based applications, most traffic flows are between end-user devices and applications either running on infrastructure/platform-as-a-service hosted in third-party data centers, or delivered as a software-as-a-service.

**Figure 2: The Current Dominant 3-Tier WAN Model**

**Figure 1: Is Cloud More or Less Secure than On-Premises?**

- More Secure: 44.4%
- About the Same: 25.9%
- Less Secure: 18.5%
- Other: 11.1%

**Why More Secure?**
- “Can’t keep up with changing regulatory / compliance / threat environment”
- “Major providers invest more than we can”
The Cloud Requires a New WAN Based on Simplicity and Intelligence

Organizations continue to increase their number of physical locations, often by breaking up large ones into multiple smaller ones, or by extending applications into the home via telework. Emerging, cloud-optimized WAN approaches include Direct Internet Access, and SD-WAN.

Direct Internet Access

Replacing MPLS with direct Internet-connected offices has emerged as a way for IT to decrease network spend while increasing bandwidth and avoiding backhaul of traffic destined for the Internet. When using UCaaS, Internet-connected branches can improve performance by reducing latency associated with backhauling Internet-bound traffic across the WAN, and can further reduce costs by eliminating local loops or SIP trunks for PSTN access. Offloading some or all such traffic to lower-cost branch Internet access reduces or avoids loads on high-cost WAN links (and thereby reduces WAN performance challenges, as well), reduces loads on firewalls and other security systems in the data center, frees up data center Internet bandwidth, and can even reduce overall vulnerability to denial-of-service attacks against the data centers (and other incidents) by making it possible for more people to get more done without using data center services.

Internet-enabled branches come in two flavors—branches with direct Internet access supplementing dedicated WAN links, and branches with Internet links only—with variations on each. (Please see Figure 3.)

Figure 3: From Traditional WAN and Backhaul to Internet-Enabled Branches
Internet-only branches substitute cheaper bandwidth for MPLS for all branch communications. In this scenario, connectivity comes in three flavors: VPN-only, split pipe, and Internet only.

- VPN-only connections use the whole Internet link as an encrypted pipe back to a company data center.
- Internet-only connections use the whole link to send traffic out to the Internet. To them, the company data center looks like any other Internet site, and staff in such sites approach all internal systems just as they would if they were not on a company network: through public interfaces or via a device-specific VPN rather than a full-site VPN.
- Split-pipe installations devote some bandwidth to a site-to-site VPN and the rest to direct Internet access.

As noted, all Internet-connected branch approaches offer the potential to reduce costs and align network design more closely with data traffic flows. But purely Internet-connected branches offer little opportunity for network architects to optimize connections for specific applications, enable insight into performance between branch offices and SaaS providers, or enable optimized utilization of multiple Internet connections or mixed Internet and MPLS scenarios.

**Enter SD-WAN**

Software-Defined WAN, or SD-WAN optimizes branch connectivity by incorporating several key concepts:

- **Abstraction of edge connectivity**: Virtually combining all the connections (Internet and MPLS) into a location to appear as a single pool of capacity available to all services.
- **Virtualization of the WAN**: Overlaying one or more logical WANs on the pool of connectivity, with behavior and topology for each overlay WAN defined to suit the needs of specific types of network services, locations, or users.
- **Policy-driven, centralized management**: Key to an SD-WAN is the ability to define behaviors for an overlay WAN and have them implemented across the entire infrastructure without requiring

![SD-WAN State of Deployment](image_url)
device-by-device configuration.

- Flexible traffic management for performance and security: SD-WANs can optimize traffic in many ways; foremost, they can selectively route traffic across links based on criteria such as link performance, availability, or end-to-end performance between the branch and the SaaS application being used.

Interest in SD-WAN is exploding, with 27% of companies using it or planning to have deployed it by the end of 2016, and another 36% evaluating potential future deployments. Early adopters report a 95% reduction in troubleshooting time and a nearly equal reduction in outages. Nearly a quarter plan to use SD-WAN to reduce spend on MPLS.

**Types of SD-WAN**

There are two key ways to provide SD-WAN services. Nemertes calls these *overlay* and *in-net* SD-WAN.

**Overlay SD-WAN**

In an overlay SD-WAN, appliances are deployed on an existing routed network, either behind the routers or replacing them as the branch connection to the WAN. SD-WAN appliances can also collapse the typical branch stack by replacing other branch WAN appliances such as optimizers and firewalls.
In-Net SD-WAN

In contrast, in-net SD-WAN ties the SD-WAN functionality to the connectivity services. These functions may all be provided in the service provider’s edge and core infrastructure, with the branch using a traditional router to connect to the provider’s nearest point of presence. Or, some or all functions may be provided on-premises via appliances under service provider management; this pushes work out of the service provider’s infrastructure and also allows optimization of last-mile connectivity via compression.

In-net SD-WAN can be tied to Network Functions Virtualization (NFV), with the various functions provided by separate, cooperating Virtual Network Functions (VNFs) dynamically downloaded to the on-premises device (where there is one) or chained into the traffic path in the carrier infrastructure. This opens the possibility of the on-premises device being white-box/generic rather than bespoke for the service, decreasing vendor lock-in somewhat.

Direct Cloud Connect (DCC)

Of course sometimes, routing traffic over the Internet isn’t the ideal option. Examples include when an organization wants to adopt UCaaS before it has the opportunity to transition to SD-WAN, or where an SD-WAN transition isn’t cost-effective. In such cases, the variability in performance of an Internet-only link, or
back-hauling Internet-bound traffic across the WAN can lead to unacceptable performance variation for the services. In response, major cloud vendors such as Amazon and Microsoft introduced the ability to connect directly to their network edges, with services such as Amazon’s Direct Connect and Microsoft’s ExpressRoute. UCaaS providers are getting into the game as well, for example RingCentral CloudConnect. In all these examples, an enterprise extends a link from an edge router in its infrastructure to an edge router in the provider’s. This can be achieved directly via a cable pull, in cases where the business has some infrastructure in the same data center as the cloud provider (the “meet me” space). Or it can be achieved indirectly, by the enterprise leasing a router port in such a facility from its connectivity provider—extending its WAN to that router—and having the connection pulled from there. Thirty-four percent of companies currently use direct cloud connect, with another 43% evaluating potential future deployments. Direct cloud connect use positively correlates with how Nemertes benchmark participants rate the overall success of their cloud strategy.

**WAN-Cloud Exchanges (WAN-CX)**

WAN-CX solutions provide an alternative to DCC by letting WAN service providers interconnect an enterprise data network with SaaS providers. Exchanges take the idea of DCC and introduce a layer of mediation and abstraction: businesses connect to the “outside” of the exchange, and CSPs connect to the “inside” of it. Through a single connection to the exchange, customers can spin up multiple virtual DCCs to any provider connected to the exchange.

WAN-CX providers can be traditional carriers or network-as-a-service providers; or connectivity exchanges operating inside carrier hotels and big colocation/hosting facilities that serve as a third-party junction point between the WAN and the CSPs. Examples include AT&T NetBond, Equinix Cloud Exchange, Level 3 Cloud Connect, and Verizon Secure Cloud Interconnect.

Just 17% of companies are using WAN-CX but another 35% are evaluating it for potential future use. Like direct cloud connect, WAN-CX use also positively correlates with how Nemertes benchmark participants rate the overall success of their cloud strategy.

**Making the Business Case for SD-WAN**

**Bottom Line Benefits: Cost Savings**

First and foremost the business case for most SD-WAN adopters is cost savings, and the main source of hard-dollar cost savings in SD-WAN is the substitution of lower-cost Internet connectivity in place of more expensive services like MPLS. Savings are entirely dependent on the cost and availability of Internet access, current MPLS
rates, and the scope of the transition. One Nemertes client operating a 200 site MPLS network reduced expected WAN spend by $4.9 million over three years by shifting MPLS to SD-WAN over Internet services. (Please see Figure 6.)

Figure 7: SD-WAN Cost Savings Example

**Top-Line Benefits: Business Agility**

Speed has value in business. For the growing number of businesses adopting a “get closer to the customer” approach to their physical storefronts, that speed can be measured in part by how many days it takes to turn up a new branch. SD-WAN can radically alter that number. Most solutions allow free mixture of different kinds of connectivity. Consequently, a new location can be brought up with whatever form of connectivity is most readily available, be it cable or DSL or even 4G/LTE, and can be come on line in under a week, even within a day of receiving its endpoint equipment. Contrast that with the more usual 30 to more than 90 days to connect up a new branch using traditional approaches.

SD-WAN also enables rapid deployment of SaaS applications with a high likelihood of acceptable remote site performance. For existing branch offices, direct cloud connect can offer acceptable SaaS performance without the need to first provision Internet out to remote branches.
Too Much Risk, or Risk Reduced?
SD-WAN solutions can also contribute to the security of an organization. Because they make it possible to more easily send traffic directly to the Internet from the branch, avoiding backhauls through the data center, most build firewall functionality around that, and all allow for careful selection of which traffic is allowed to flow direct. For example, policy can allow traffic to and from Office 365 or Salesforce to go direct, while other web-bound traffic is not.

Global WAN, Regional Services, and SD-WAN
Lastly, SD-WAN can make it easier for the organization to spin up new branches anywhere they need to, globally, by delivering a consistent set of services while taking advantage of whatever local connectivity options are available. In-net SD-WAN can enjoy a particular advantage in this scenario by using an optimized backbone to deliver “middle-mile” optimizations independent of locale, avoiding the unpredictability of multi-continental Internet performance. Bringing greater consistency as well as better performance to both in-house and SaaS applications can boost productivity globally.

Conclusions and Recommendations
Enterprise adoption of cloud-based applications is on the rise. As a result, traditional network architectures must evolve to support changing traffic flows and performance requirements associated with cloud-based applications, especially Unified Communications as a Service.

IT leaders should:
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- Enable flexibility to leverage various SD-WAN approaches where it makes sense, avoid being locked into a single global approach.

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